2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

CEQ regulations implementing the procedural provisions of NEPA require federal agencies to explore and objectively evaluate all reasonable alternatives to federal actions for which the agency has jurisdiction. The evaluation should also include a brief discussion of the alternatives eliminated from detailed study (40 CFR 1502.14). The alternatives presented in this section were developed during the public and agency scoping process described in Section 1.4.3.2 of this EIS.

This section describes the No-Action Alternative, the Proposed Action, and other reasonable alternatives that were studied in detail. Based on the information and analyses presented in Section 3.0 Affected Environment and Section 4.0 Environmental Effects, Section 2.5 presents a matrix comparing the beneficial and adverse environmental effects of each alternative.

2.1 DESCRIPTION OF ALTERNATIVES

2.1.1 Compromise Area Alternative (IMC's Proposed Action)

2.1.1.1 Development of the Proposed Action

As described in Section 1.4.3.2 of this EIS, an intensive public and agency scoping process involving numerous meetings and field trips, etc., contributed to the development of IMC's Proposed Action. As shown on Figure 2.1-1, initially IMC proposed to mine 17,593 acres of the entire 20,676 acres at the Ona site (Section 2.4.1). Between August 1999 and February 2000, AWG and PWG members attended additional meetings and site tours. As described in Section 2.4.3, these groups identified "areas of conservation interest" (see Figure 2.1-2), and using an iterative process, suggested an alternative to mine only 12,969 acres, and preserve the rest of the site. Based upon the results of numerous meetings, and the conservation alternative, IMC over time developed the Compromise Area Alternative. Figure 2.1-3 shows the area that IMC is proposing to mine.

IMC's proposed mining area is a compromise to mine part of the ore reserve while conserving much of the natural ecosystem. This alternative would not disturb 1,448.7 acres of wetlands, or about 36 percent of all wetland areas on the site. In addition, mining related activities would not disturb 30.7 acres of open water, 3,359.2 acres of uplands, and one acre of barren land or roadways, for a total of 4,839 acres or about 23 percent of the entire Ona site. This total includes lands considered as "areas of conservation interest," as well as land within property line setbacks or natural and improved lands that are not economically mineable. The "areas of conservation interest" include xeric forests, pine flatwoods, palmetto prairie, and wetlands.

IMC's Compromise Area Alternative would result in the mining of 15,527 acres of the Ona site, and the recovery of approximately 103 million tons of phosphate rock. An additional 309 acres would be disturbed but not mined. Compared to IMC's original plan (Section 2.1.2), this Alternative reduces the amount of recovered phosphate rock by approximately 34 million tons, thereby, reducing the severance tax paid to the State of Florida by approximately $45 million and the property tax that Hardee County and associated governments (CFRPC, SWFWMD, etc.) would collect by approximately $4 million.

IMC proposes the Compromise Area Alternative as a balance between the need to minimize impacts to important natural habitat types, and the need to extract and beneficially utilize the geologic phosphate rock resource.

2.1.1.2 Description of Proposed Action

IMC proposes to construct and operate a surface mine for the recovery of phosphate rock from its 20,676-acre property in western Hardee County near the rural community of Ona, Florida. As proposed, mining and reclamation would initially occur on the Ona site, with beneficiation and shipment of the mined phosphate matrix at the existing IMC beneficiation plant at the Fort Green Mine located in Polk and Hardee Counties. At a later date, which is yet to be determined, a new beneficiation plant would be constructed at the Ona site, and would include a washer, a flotation plant, product inventory, shipping facility, and miscellaneous support facilities. Once this plant is operational, the reserves remaining at the Ona Mine would be processed at the new Ona Mine beneficiation plant. There would be no chemical plant, gypsum stack, or rock dryer at the Ona site.

Over many decades, significant portions of the Ona Mine site have been converted from their natural state to agriculture, chiefly as improved pastureland. The natural ecosystems on most of these agricultural lands have been altered for agricultural use. IMC proposes to mine these areas and to reclaim them to an appropriate blend of agricultural use and natural habitat values. However, within the Ona site there are also areas of less historic disturbance that are considered to be of ecological value. Consequently, IMC proposes not to mine about 4,839 acres including ecologically valuable areas. This no mine area is approximately 23 percent of the total acreage of the Ona site.

IMC intends to use the “opencast” surface mining method for development of the Ona Mine. This method begins when large electrically powered excavators (draglines) first remove and set aside the overlying soil overburden and then excavate the phosphate ore matrix. The matrix is then placed by the dragline into a shallow depression at the ground surface where it is disaggregated and mixed with water and converted into slurry form. Then electrically powered pumps are used to transport the matrix through pipelines to the beneficiation facility, where the phosphate rock is separated from the sand and clay soil in which the ore is found.

The phosphate minerals are recovered at the beneficiation plant by washing and screening the slurry matrix for the larger particles, and through flotation for the smaller particles. The sand and clay are returned to the mine for use in reclamation, again through pipelines as slurry.

The product generated by beneficiation is “wet rock” phosphate and would be shipped to customers or IMC concentrates/fertilizer plants by rail. “Wet rock” product is shipped without drying, and contains about ten percent moisture when shipped.

The proposed operations would involve mining and processing methods that are commonly used in the extraction and processing of phosphate ore in the Central Florida Land-Pebble Phosphate District. A general process flow chart for the Ona Mine is presented as Figure 2.1-4. Major phases of the proposed operation would include:

1. Clearing and preparing the site for operations;
2. Constructing the clay settling areas, ditch and berm system, wells, water and wastewater control and re-circulation systems;
3. Constructing onsite transportation systems, and other ancillary operations;
4. Constructing the beneficiation plant (at a later date);
5. Uncovering and extracting the phosphate ore-bearing matrix by electric-powered dragline;
6. Transporting the matrix to the existing Fort Green or proposed Ona beneficiation plant by slurry pipeline;
7. Physically separating the phosphate ore from the sand and clay (wastes);
8. Disposing of the sand and clay wastes in the mine area;
9. Shipping the phosphate ore from the facility by rail; and,
10. Reclaiming or restoring the disturbed areas.

Three distinct methods of reclamation would be used in creation of the post-reclamation landscape. These are known as: 1) the sand fill with overburden cap method, 2) the shaped overburden (land and lake) method, and 3) the crustal development method for reclamation of clay settling areas.

2.1.2 IMC’s Original Area to be Mined Alternative

IMC’s original mining plan was prepared based on avoiding large floodplains, and some habitat areas where there was little or no ore. This plan proposed mining approximately 17,593 acres of the Ona site to recover approximately 137 million tons of phosphate rock. The proposed area is presented on Figure 2.1-1. The primary habitat areas avoided were the Horse Creek and Brushy Creek floodplains.

The mining methods and proposed operations would be the similar to those described in Section 2.1.1 for IMC’s Proposed Action Alternative.

2.1.3 Natural Systems Group Recommended Areas of Conservation Interest

As described in the CDA, from 1997 through 2000 intensive series of meetings, workshops, field tours, and work sessions were convened to implement the ecosystem management/team permitting process (see Section 1.7). Beginning in mid-1999, the natural systems sub-group of the AWG began identifying those lands that possess sufficient ecological attributes to consider not disturbing them by mining operations. Such areas have been termed "areas of conservation interest" by the AWG and PWG. There was not unanimous agreement among the AWG and PWG members as to which areas were of conservation interest. To help the process move forward, the members were asked to identify, in an ideal world, all areas of ecological interest. This resulted in a "first cut" for the "areas of conservation interest."

Representatives of both the principal and commenting agencies utilized this "first cut'" as well as the results from the wildlife surveys, upland and wetland vegetative descriptions and analyses that are presented in Sections 3.2, 3.3 and 3.4, to support the review process. As described in the CDA, some AWG members participated in site tours and discussions concerning the potential to reclaim mined land to specific habitat types. These efforts led to the development of an AWG delineation of areas of conservation interest in July 1999 as shown on Figure 2.1-2. This alternative proposed mining approximately 12,969 acres of the Ona site and recovering approximately 85 million tons of phosphate rock. The mining methods and proposed operations would be similar to those described in Section 2.1.1 for IMC's Proposed Action Alternative.

2.1.4 No USACE Jurisdictional Wetlands Impacts Alternative

Under the No USACE Jurisdictional Wetlands Impacts Alternative, IMC would only conduct mining operations in the upland areas of the Ona site that are accessible from the existing Fort Green Mine without crossing any jurisdictional wetlands. This alternative would result from the denial of the Section 404 Dredge and Fill Permit for IMC's proposed Ona Mine. A 200-foot buffer around the wetlands for ditch/berm systems and slope cut by mining, and a 500-foot buffer for dragline operations, would further limit the mineable area. Thus, mining would be limited to some small upland areas on the western side of Horse Creek, which is approximately 1,122 acres and is shown in Figure 2.1-5. This reduction in size would make the Ona Mine much less economically viable.

2.1.5 No Action Alternative

Under this alternative, a permit for the Proposed Action would not be issued and no mining would occur on the Ona site. The existing environment on the site may or may not remain unchanged. More intensive agricultural land uses are displacing agricultural land in the urbanizing areas of central Florida, such as near Tampa, Orlando, and Bradenton-Sarasota. As these urban areas continue to grow and displace agricultural land, there may be more demand to use the Ona site for more intensive agricultural activities or for residential. Additional development is presently underway in the vicinity of the Ona site in the form of utility infrastructure, including several power plants and a wastewater treatment plant. Development of the Ona site to support agricultural and residential uses would reduce the probability of permanent preservation of critical areas and natural corridors through conservation easements or CARL purchases. Under the agricultural and residential land use scenario, additional NEBs would not be realized, such as the creation of lakes.

2.2 MINING TECHNIQUES CONSIDERED

The following sections describe the various mining techniques that have been considered. They are based on IMC's proposed approach, current technology available in the phosphate industry, and the techniques described in a prior EIS, which was for a mine that included about two-thirds of the proposed Ona site, and was prepared for Mississippi Chemical Corporation (MCC) (USEPA, 1981a).

2.2.1 Mining Area Selection

A four-year long public and agency involvement process was used to evaluate various mining area options. This process is described in detail in Section 1.4.3.2 of this EIS. The land area that IMC proposes to mine is the result of this process. A summary of the alternatives that these groups considered is presented in the Sections 2.1 and 2.3. These summaries provide insight into the range of alternatives considered and the factors that were used to develop IMC's Compromise Area Alternative.

2.2.2 Mining Methods

The main factors in the selection of the mining method were identified in the MCC EIS (USEPA, 1981a; page 2.1-2). The factors identified include:

1. The spatial characteristics of the deposit (such as size, shape, attitude or dip and strike of deposit, and depth);
2. Hydrogeologic conditions of the ground and surface waters;
3. The physical properties of the mineral deposit and the surrounding rock or sediments;
4. Economic factors, including the grade of the ore (matrix), comparative mining costs, and desired production rates; and,
5. Potential environmental impacts of the mining and processing activities on downstream water supplies, critical habitats, threatened or endangered species, condition of the post mining land surface after reclamation, and the potential for water and air pollution.

In central Florida, the use of surface mining methods in the extraction of the matrix are favored due to the unconsolidated nature of the overburden and the proximity of the ore to the ground surface. Like other deposits in the area, the phosphate deposits at the Ona site are bedded deposits that follow the sedimentary layers/patterns.

Both dragline and dredge surface mining methods have been considered for use at the proposed Ona Mine. For both techniques, all the vegetation must be cleared. Each of these methods is described in detail in the following sections.

2.2.2.1 Dragline Mining (IMC's Proposed Action)

2.2.2.1.1 System Description

The dragline method is the primary mining method used in the central Florida phosphate industry, and has been for the last 60 years. It is described in the MCC EIS (USEPA, 1981a; page 2.1-3) as:

> *"…large, electric-powered, walking draglines, which have buckets ranging from approximately 7 to 65 cubic yards in capacity. Dragline excavators are essentially large cranes with a drag bucket on the hoist cable. Loading is affected by pulling the bucket towards the machine with a drag cable along the top layer of material. When the bucket is filled, it is hoisted, and the boom and bucket are moved to the desired dumping position. The empty bucket is then swung back to a suitable position for the next loading cycle.*
>
> *Draglines excavate mining cuts averaging 300 feet wide and up to a mile long by stripping and side casting the overburden material into adjacent mined-out areas. The exposed matrix is then mined and placed in a slurry pit adjacent to the excavation."*

IMC's proposed mining method is the same, except that IMC proposes to use dragline buckets ranging in size from 30 cubic yards to 65 cubic yards (IMC, 2002).

IMC intends to use the same conventional, opencast strip-mining techniques as approved for its Fort Green Mine and other mines in the same region. The mining is planned to be accomplished using five or more draglines during the mine's peak production. The proposed mine plan shown on Figure 2.2-1 is based on five draglines for most of the time (two for years one to nine and five thereafter). However, production requirements may dictate that this schedule be altered at some time during the life of the mine, and more than five draglines may be used at any one time. IMC currently has five draglines at the Fort Green Mine, and others at adjacent mines that could be assigned and moved to the Ona Mine (IMC, 2002).

As described in the CDA and Additional Information submittals 1, 2, and 3 (IMC, 2002), IMC's proposed mining sequence has been designed in consideration of the need to:

1. Create storage capacity for disposal of clay and sand;
2. Protect designated areas of upland and wetland natural systems;

3. Maintain a consistent quality ore blend at the beneficiation plant to optimize the recovery of the phosphate resource; and,

4. Use a logical progression of mining operations across the Ona site to minimize relocations of draglines and pumping systems.

The mine plan and sequence are controlled to a great extent by the need to mine areas for clay settling first (the mine cannot operate without adequate clay storage). Certain habitat reclamation goals come next, controlled by the sand tailings fill schedule.

Starting with the available area (i.e., lands not affected by Hardee County setback requirements or designated as "no-mine areas of conservation interest"), IMC's plan is presented in "blocks" with each block representing an area that could be mined in one year by one dragline, along with the associated pipeline system. IMC's current estimate of how the mining operations would progress during the life of the proposed Ona mine is presented in Figure 2.2-1.

Within each mining block, IMC would employ a series of steps and procedures to avoid, or minimize and mitigate, environmental impacts typically associated with surface mining in Florida. Prior to commencing mining operations in each area that could harbor wildlife populations, IMC biologists would conduct specific pre-clearing wildlife surveys that would also include restocking wildlife according to the wildlife management plan as summarized in Section 4.4. Thereafter, IMC would construct perimeter berm and swale systems that serve the multiple purposes of: 1) capturing turbid storm water runoff from the active mining operation; and 2) maintaining the water table on adjoining sensitive lands (e.g., other private properties and wetlands). Section 4.7 describes how the Best Management Practice (BMP) perimeter berm and swale systems would be constructed and function. Subsequently, IMC would clear the land directionally away from active mining areas toward undisturbed or reclaimed land so as to complete the wildlife relocation process (IMC, 2002).

The mining sequence proposed by IMC limits the number of dragline and pipeline access corridor crossings of "no-mine areas of conservation interest", including the floodplains of Brady Branch and Brushy Creek. As noted in the CDA, where possible, IMC has positioned the unavoidable corridor crossing at locations where there would be the least wetland and habitat impact (IMC, 2002). Under current plans, Brushy Creek has two such crossings, West Branch Horse Creek has two, Oak Creek has one, and Horse Creek would have no crossings.

The total area scheduled for mining and disturbance by the Ona Mine is estimated to be about 15,836 acres, of which 15,527 acres would be mined. The current mining production rates for the site are listed on Table 2.2-1 and the mine plan is summarized on Figure 2.2-1. Included in the 15,836 acres is land disturbance for non-mining activities such as roads, pipelines, ditches, etc., that would occur adjacent to active mining areas. Most non-mining disturbances, however, would occur in areas that would be scheduled for subsequent mining (IMC, 2002).

The projected mining schedule is, at best, an estimate that can be influenced by many factors including market demand, economics, permit conditions, and new information on geology. As stated in the CDA (IMC, 2002) and noted previously, IMC may adjust the specific schedule and sequence shown in the mine plan to respond to conditions at the time of mining.

Table 2.2-1 provides proposed average and maximum mining rates based on the current plans for the Ona Mine. As market conditions and/or subsequent permit limitations may cause the plans to change, yearly production cannot be predicted with certainty. For this reason, the average mining rate is used to predict the mine life, and the maximum mining rate is used for gauging other impacts. The average mining rate is based on the total acres available for mining, divided by the estimated mine life in years (15,527 acres/24 years = 647 acres/year) (IMC, 2002).

The maximum mining rate shown in Table 2.2-1 is based upon the mine operating three shifts per day, seven days per week, 52 weeks per year, with five or more draglines, using a sequence that would maximize the rate of mining. This maximum mining rate schedule is assumed to produce the maximum impact. A reduction of the operating schedule (e.g., a reduction from a seven-day work week to a five-day work week to meet market conditions) would reduce the mining rate and extend the mine life, and thus, presumably reduce the annual impact. This maximum rate of mining, if maintained for the life of the mine, would complete mining in 16 years. The operation schedule is based on the concept that for the first eight years, two draglines would be used with the extracted ore transported to the Fort Green Beneficiation Plant. In the ninth year, three other draglines would be moved to the Ona Mine (IMC, 2002).

The access corridors shown on Figure 2.2-1 are located to provide for the mine transportation needs of the ore (matrix), clay and sand tailings, power lines, water recirculation system, and mobile mine equipment (both on roads and dragline walk paths). The basic design provides a containment ditch and berm on both sides, and room for operational use. The corridors shown on Figure 2.2-1 are either 400 or 600 feet wide, depending on the need for clay and water recirculation pipes or ditches. Typical cross sections are shown on Figure 2.2-2. The access corridors would remain active until they are no longer needed, then being reclaimed (leaving roads for land management activities, including the crossing of the floodplains as described in Section 4.2) (IMC, 2002).

The information supplied in Table 2.2-2 is IMC’s current estimate of areas for mining based on limited prospect drilling information. Currently available prospect data indicates that the overburden thickness averages about 33 feet, and the matrix (ore) thickness averages about 26 feet, for a total average mining depth of about 59 feet. The final acreage that would be mined may decrease due to currently unknown permit and/or field conditions, and assumptions for various factors (e.g., economics, setbacks, matrix thickness, etc.) used in the mine planning. As the prospecting is completed, the estimated amounts of ore and sand /clay waste can be expected to change. For this reason, the mining sequence is subject to change, such that the sequence shown on Figure 2.2-1 represents only one of many possibilities. The actual mining sequence would be determined on a year-to-year basis, and would be part of the information contained in annual reports. Flexibility to change the mining plan is an economic necessity due to fluctuating market demands and to the variable nature of the deposits (IMC, 2002).

IMC proposes to close Sydney Roberts Road (In Sections 15 &16) to allow mining of the matrix. Currently, Sydney Roberts Road is a dead end and only provides access to the Ona site. Once mining operations begin on the site, IMC would be the only users of the road. Post Plant Road and other roads in Sections 29 & 30, Township 33 South, Range 23 East, may also be proposed for closure or relocation (see Figure 2.2-1)(IMC, 2002).

2.2.2.1.2 Environmental Considerations

Draglines are more efficient than dredge-mining methods in the consumption of electricity. As discussed in the MCC EIS (USEPA, 1981a; page 2.1-4) previous analyses show that dragline power consumption per ton of product is about half that of the dredge mining method.

In addition to clearing vegetation in areas to be mined or used for waste disposal storage, which is common to all mining methods, transport routes must be provided to allow the dragline to move around the site. Transport routes are typically selected to avoid disturbing sensitive lands that would not otherwise be affected by the mining operations. Because dragline relocation can be particularly impacting at stream crossings (USEPA, 1981a), IMC has limited the number and location of such crossings.

When draglines are used, the mine pits must be dewatered for efficient mining. This dewatering can affect the water table of adjacent property owners and sensitive habitats. Certain precautions, such as setbacks and use of perimeter ditches can minimize these adverse impacts. Additionally, because the subsurface soils are usually moist, draglines produce little fugitive dust (USEPA, 1981a). Draglines also allow the recovery of phosphate matrix to be more complete (USEPA, 1981a).

2.2.2.1.3 Technical Considerations

Walking draglines are versatile machines that perform optimally when digging unconsolidated material (soil). The long reach of the dragline enables it to dig and move the soil overburden and mine the matrix without re-handling the materials. Draglines can selectively mine and cast overburden. Draglines can selectively strip and place the leach zone material near the bottom of the mining cut, subsequently covering the leach zone material with overburden spoils (USEPA, 1981a).

For safety and optimum matrix recovery, a dragline needs the mining cut to be essentially dry (no free flowing water). High water table conditions in the overburden, combined with unfavorable soil conditions, can result in slope failure of the sidewalls (the side walls are called “high walls,” but this does not necessarily indicate the height of the cut slope). Slope failure could be a safety hazard. Excessive water in the mine cut also makes it more difficult for the operator to identify the matrix horizon. This can impact the matrix recovery, and the production rate. Normal dragline operation, with appropriate pit dewatering, provides good control of the mine cut (including slope failure), and matrix removal (USEPA, 1981a).

2.2.2.2 Dredge Mining

2.2.2.2.1 <u>System Description</u>

Dredges are used to a limited extent in Florida phosphate mining. Only one mine used dredges. This mine has operated intermittently over the last ten years because of the economics of the operation. Dredges can be used to excavate submerged overburden and matrix. The dredge is operated within a pond area, which is advanced by the operating dredge. A typical dredge design consists of excavating equipment mounted on a barge, with the excavating part of the dredge supported on a boom at the forward end. Several retractable anchor posts are located at the stern to hold the barge in place, and to allow the barge to pivot (USEPA, 1981a).

There are two basic types of dredge, mechanical and hydraulic. As described in the MCC EIS (USEPA, 1981a; page 2.1-6), mechanical dredges excavate bulk material and fall principally into the following general categories: 1) a grapple dredge, which a dry land clamshell or dragline mounted on a barge; 2) a dipper dredge, which is a barge-mounted power shovel; and 3) bucket ladder dredge, which is a chain of buckets moving from the work face to a point above the surface of the water.

Hydraulic dredges continuously remove sediments through by suction of a dredge pump, supplemented by mechanical excavators, when necessary. The principal types of hydraulic dredges employed in the mining industry are: 1) plain suction dredge, the simplest form of hydraulic dredge that uses no excavator; and 2) cutterhead pipeline dredge, which is similar to the plain suction dredge but is equipped with a rotating cutter surrounding the intake end of the suction pipe. The cutterhead pipeline dredge is considered to be the most appropriate for use in Florida phosphate mining operations (USEPA, 1981a).

At least six large capacity dredges would be required to mine IMC's Ona site in approximately the same amount of time. Three of the barges would strip the overburden and the other three would mine the matrix. The overburden dredge would excavate ahead of the matrix dredge. Overburden material would be pumped as slurry to reclaim previously mined areas. Water removed from the overburden slurry would flow back to the dredge pond and would be re-circulated. The matrix dredge would excavate the phosphate ore, and the resulting slurry would be pumped to the beneficiation plant (USEPA, 1981a).

2.2.2.2.2 Environmental Considerations

Dredge systems use a lot of energy and water compared to a dragline. The dredge system consumes a lot of water because of water entrainment in clays in both the overburden and the matrix, and through evaporation from the dredge ponds. Since the dredges require ponded areas in which to work, dewatering is not necessary to strip the overburden.

Since a dredge cannot selectively dispose of areas of non-phosphate bearing material within the matrix zone, dilution of the ore can occur. This can result in the transport of material to the beneficiation plant that has a lower phosphate to waste ratio. This increases power consumption and mining cost (USEPA, 1981a).

2.2.2.2.3 Technical Considerations

The benefit of the dredge is its ability to mine materials that are submerged in water. Most dredges are electric-powered and perform well when mining unconsolidated, sandy material, but do not perform well when hardpan or stiff clay zones are present (USEPA, 1981a). The Ona site has both of these conditions.

Because the area being mined is submerged, the operator cannot directly see the phosphate matrix/bedrock contact as it is being mined. Therefore, detailed mapping of the matrix horizon contacts and precise dredge control is required to ensure maximum recovery and to avoid dilution of the phosphate matrix (USEPA, 1981a).

2.2.2.3 Mining Method Summary

Draglines are considered the preferable mining method from both a production and environmental standpoint. Although they require dewatering of the mine cut, draglines remove essentially the entire phosphate matrix, and are more energy efficient (USEPA, 1981a). For these reasons, the dredge mining system was dropped from consideration and not studied in detail.

2.2.3 Matrix Transport

The matrix is transferred from the mining areas to the beneficiation plant after it has been excavated. The methods of transporting matrix to the plant area are energy intensive since large volumes of material must be moved. The selected transport method would preferably have relatively low cost and minimal effect on the environment (USEPA, 1981a). Two alternate methods of transporting the matrix from the mine to the beneficiation plant were evaluated for the Ona Mine. These are slurry pipeline and conveyor transport, and are described in the following sections.

2.2.3.1 Matrix Transport by Slurry Pipeline (IMC's Proposed Action)

2.2.3.1.1 System Description

The slurry pipeline matrix transportation system is currently being used exclusively in the central Florida phosphate district. After stacking the excavated matrix outside the excavation area, it is placed into a slurry pit or "well." The matrix is partially separated during the slurry process by high pressure water jets, called hydraulic monitors or guns, then directed into the matrix pile to break-up and slurry the ore. Large rocks and debris are screened out before the slurry is pumped through pipelines to the beneficiation plant. The use of pipelines to transport the matrix provides a flexible and easily managed system that can be routed around obstacles, and readily fit to any mining configuration (USEPA, 1981a).

To transport the slurry, IMC proposes multiple independent pipeline systems that would initially extend from each of IMC's mining locations to the Fort Green southern washer facility, but eventually would extend to the Ona beneficiation plant, once operational. Each pipeline system would be similar to those presently in use elsewhere in the central Florida phosphate district and would consist of a slurry pit, slurry pit guns, a sieve screen (grizzly screen), a pit pump, booster pumps, and the pipeline. The slurry pit would be approximately 160 feet in diameter. The pit guns would be located at the pit discharge just before the point where the matrix enters the pipeline. The pit pump would "lift" the matrix out of the slurry pit into the pipeline. The matrix pipeline would be 20 to 22 inches in diameter with a flow of 16,000 to 18,000 gallons per minute (gpm). The pipeline would have booster pumps spaced approximately 4,000 to 5,000 feet apart along its length. The locations of the matrix booster pumps would vary depending on the size and availability of the individual pumps to be used, and the topography of the transportation route (USEPA, 1981a; IMC, 2002).

The access corridors shown on Figure 2.2-1 are located to transport the ore (matrix), clay and sand tailings, etc, from the mine to the beneficiation plant and back to the mine area for sand and clay deposition and reclamation. Typical cross sections are shown on Figure 2.2-2. The access corridors are located to provide the shortest possible path for movement of the materials, since the cost of energy to pump the matrix and tailings is a function of the distance. At stream crossings, the slurry pipes would be encased so if a break were to occur, the contents would be diverted to a catchment area rather than being released to the stream. The catchment areas would be sized based on the slurry line capacity and estimated time until the line could be stopped for repaired (IMC, 2002).

2.2.3.1.2 Environmental Considerations

Vegetation would be removed and wildlife disturbed or displaced along the actual path of the pipeline transport system. In addition, pipeline or pump failure could result in the release of matrix slurry. This is of particular concern at stream crossings since such a failure could result in slurry being released directly into the stream. IMC proposes to use encased pipelines and leak detectors at stream crossings, as well as other operational and preventive maintenance practices used in the phosphate industry (i.e. pipeline inspection, rotation, and low pressure shutoff systems and corridor side berms) (IMC, 2002).

The pipeline transport system is energy intensive because of friction losses in the pipeline, and because the slurry must be pumped at high velocities (greater than 14 feet per second) to keep the large particle sizes suspended and moving (USEPA, 1981a).

Matrix transported in a slurry system is closed to the atmosphere, and consequently, is not a source of air pollution. Therefore, air pollution equipment, and the energy required to operate such equipment, is not needed in a slurry transportation system (USEPA, 1981a).

2.2.3.1.3 Technical Considerations

Slurry transport can move large volumes of matrix over variable ground conditions. Slurry transport also helps to disaggregate the matrix prior to its arrival at the washer system. The slurry transport system is highly mobile and easily adapted to changes in mining location. In addition, the system is not hampered by weather conditions. Slurry pumping systems are a proven technology with which the industry has a great deal of experience (USEPA, 1981a). The existing Fort Green Mine uses a slurry transport system, and therefore has the equipment needed to transport the matrix in this manner. Expansion of the system to accommodate the Ona Mine would not require much additional equipment. This equipment would be transferred to the Ona Mine operation when the Ona beneficiation plant is built.

2.2.3.2 Matrix Transport by Conveyor

2.2.3.2.1 System Description

Some phosphate mining companies have considered conveyor transport systems as an alternate method for matrix transport. Formerly, one such phosphate company in Florida used a conveyor belt system, but later abandoned it and installed a slurry pipeline system (USEPA, 1981a).

A conveyor system is a complex set of mechanical components that supports and propels a belt. This belt carries the bulk material that is being transported. The conveyor system is suited for continuous transport of bulk material when loaded at a relatively uniform rate. Although the total quantity of matrix to be transported suggests that a conveyor system could be efficient for phosphate mining (USEPA, 1981a), and if the economics of using such a system improve, it may be considered for the future.

For matrix transport at the Ona Mine, multiple independent conveyor systems would be required to transfer the matrix from each mining area to the beneficiation plant. Each transfer point would consist of an exchange of matrix from one conveyor to another in order to keep the conveyor lengths manageable. To transport the required amount of matrix from the mining areas to the beneficiation area, a 48 to 96-inch wide conveyor systems would be needed (IMC, 2002).

2.2.3.2.2 Environmental Considerations

The impacts of the conveyor transport system are similar to those associated with the slurry pipeline system, as described in Section 2.2.3.1, except that water is not required for conveyor transport. In fact, in order to transport the matrix without excessive spilling and loss, the matrix must be dewatered to about 70 to 80 percent solids. To maintain a low water content in central Florida, the conveyor system would likely need to be enclosed. The conveyor would be completely enclosed at sensitive points (road or stream crossings) in order to contain potential spills.

2.2.3.2.3 Technical Considerations

As described in the MCC EIS (USEPA, 1981a; page 2.3-4), the design of a conveyor system requires consideration of such factors as: 1) the characteristics of the material to be conveyed (moisture density, lump size, fines, condition, particle shape); 2) the rate of transport; and, 3) the need to handle the material at different rates. Generally, the characteristics of the material to be transported must remain constant. To ensure this, the matrix must be handled twice at the mine area, including moving it from the mining unit to a storage/dewatering pile, and to the conveyor system for crushing and transport.

The design concept would have the dragline place the matrix in a line on the bank parallel to the mine cut. After adequate drainage time, the matrix would be loaded by a front-end loader into a feeder/breaker to crush oversize particles, which would feed the movable conveyor system. The conveyor system would be moved sideways to stay parallel to the mine cuts.

Conveyor systems are not as mobile, and have higher capital and maintenance costs than a pipeline system (USEPA, 1981a).

2.2.3.3 Matrix Transport Summary

From a technical and operational standpoint, slurry pipelines provide the least expensive (substantially), most flexible, proven method of matrix transport and in keeping with experience; this system is proposed for use at the Ona site.

2.2.4 Matrix Processing

After the matrix is mined and transported to the plant area, it is physically separated (beneficiated) to obtain a saleable product. At the plant, the phosphate is separated from the waste materials such as sand and clay. Two systems for beneficiation of the phosphate matrix have been considered for the Ona Mine. These include wet processing (conventional beneficiation) and dry acidulation, and are described in the following sections.

2.2.4.1 Conventional Beneficiation (IMC's Proposed Action)

2.2.4.1.1 System Description

Wet flotation process beneficiation is presently employed throughout the central Florida phosphate district. It is a relatively mature technology and the general methods used today are essentially the same as those used in the 1940's. This system is most suitable with the pipeline system of matrix transport. The major components of wet processing beneficiation are the washer section, feed preparation area, and flotation plant (USEPA, 1981a).

During the first five to eight years of mining the Ona site, IMC would continue to use the Fort Green Beneficiation Plant, which uses the wet process to produce as much as 5.5 million tons per year of phosphate rock product. With constantly-evolving technological improvements and variability of the ore (matrix) reserves being mined over time, changes to the process would be made as needed to optimize beneficiation plant performance. However, these changes should not have materially adverse effects upon water consumption or discharge water quality. The proposed Ona Beneficiation Plant would be designed to recover phosphate rock from ore (matrix) representative of the southern portions of the central Florida Phosphate district. This matrix tends to have less coarse (pebble) and more fine (concentrate) product than the more northerly mines. The proposed Ona Beneficiation Plant would represent the most recent evolution of the method, incorporating IMC's experience from its other plants (IMC, 2002).

The beneficiation process begins in the mine cut near the dragline, where the raw matrix is slurried with hydraulic monitors. Large electrically powered pumps vacuum the slurried matrix and pump it to the processing plant as described in Section 2.2.3.1. The slurry is adjusted along the pipeline with water to maintain appropriate pumping characteristics. The slurry is separated into various grain sizes at the beneficiation plant, which are then processed to upgrade the quality of the phosphate material (IMC, 2002).

Because of the marine origin of the phosphate matrix, the proportion of grain sizes and mineralogical contaminants in each grain size fraction varies from one parcel of land to another. The mine operators have some control over the scheduling and blending to adjust for this variation, but ultimately the beneficiation plant must be able to accommodate the inevitable variations (IMC, 2002).

The process of separating the size fractions is performed in five areas of the beneficiation plant complex:

1. Washer - Slurried matrix from the mine is screened and separated into four different components in parallel circuits: coarse reject, pebble, feed for flotation, and clays in parallel circuits. The pebble is usually saleable product, the flotation feed is transferred to the Feed Preparation Plant, and the clays and coarse reject are pumped to the appropriate disposal areas (clay settling areas, reclamation area, etc.).

2. Feed Preparation - The feed component is further screened into three sizes, spiral feed, coarse feed, and fine feed for processing. The coarse and fine feeds are transferred to their respective conventional flotation circuits; the spiral feed is transferred to a spiral flotation circuit.

3. Flotation - Flotation is done in separate parallel circuits for the coarse and fine feed size components. The two are separated because the different particle sizes and weights respond differently to the flotation process, requiring different processing equipment. In this step of beneficiation, reagents are added to the feed and the mix is vigorously bubbled to separate the saleable phosphate material from the sand. The process has two stages: a "rougher" stage picks up virtually all the phosphate and some sand, while the "cleaner" stage floats the silica, leaving an amine phosphate concentrate product. The residual sand tailings are then pumped to the mine for use as reclamation backfill.

4. Spiral Flotation - The spiral circuit is conventionally used in the mineral industry to make gravity separations. The phosphate industry's use of the spiral is unique in that reagents are added to the feed to conduct a "skin" float on the particle. The spiral's skin float is able to recover particles that are too coarse for conventional flotation cells to float. Fine particles do not respond well on the spiral. Therefore, they must be removed from the feed to achieve saleable product grades. The sand tailings from the spiral flotation are pumped to the mine for use as reclamation backfill.

5. The Heavy Media Plant - is used to upgrade sub-grade pebble product. Due to the variations in marine laid deposits, the draglines occasionally encounter pebble that is contaminated with limestone and dolomite. The heavy media plant makes use of the different density of the components to remove the heavier phosphate material from the limestone and dolomite material.

The support facilities for the beneficiation process include a reagent storage yard. This is a tank farm with transfer pumps for preparation and storage of the various reagents used in the process. These reagents include liquid fatty acid, sulfuric acid, fuel oils, amines, solid soda ash, magnetite, and ferrosilicon. The plant design and layout would incorporate allowances for future technology development (IMC, 2002).

The waste products resulting from beneficiation are quartz sand tailings and clays. Generally, sand tailings are pumped to reclamation sites. Whenever possible, a gravity-flow system is used to transport waste clays away from the beneficiation area (USEPA, 1981a). The methods used to dispose of these waste products are described in Section 2.2.7.

After beneficiation, "wet rock" phosphate is stored in bins in the plant area for draining and grade analysis and is then transferred to a primary wet rock storage area. The "wet rock" phosphate would be shipped to customers or IMC concentrates/fertilizer plants by rail.

2.2.4.1.2 Environmental Considerations

The aboveground storage of waste clays (as described in Section 2.2.7) is the primary environmental consideration associated with the beneficiation process. Dam failures, although a remote possibility since the increased stringency of state safety requirements (F.A.C. 62-672, 1999), pose a potential for significant degradation of water quality in the receiving water systems and damage to aquatic ecosystems. The conventional wet beneficiation process requires less energy than the other alternatives (USEPA, 1981a).

2.2.4.1.3 Technical Considerations

Wet process beneficiation is the commonly used method for economically extracting phosphate product from the mined ore. The wet process is the only economically feasible method to separate the phosphate mineral particles from the clay and silica sand. Water management has improved over the years, allowing between 95 and 98 percent to be recycled. Water loss primarily occurs through evaporation from water bodies and entrainment of water in waste clays. Clay settling areas (typically above-grade) are used for waste clays. Sand tailings, another byproduct, are disposed of in mine cuts or are used to build retaining dikes for the waste clay settling areas (USEPA, 1981a).

2.2.4.2 Direct Acidulation

2.2.4.2.1 System Description

As described in the MCC EIS (USEPA, 1981a; page 2.4-5) the direct acidulation process for beneficiation has been in the experimental stage for an extended period. With direct acidulation, the matrix is digested with sulfuric acid to recover the phosphate as phosphoric acid. Initially, the matrix must be ground to a fine particle size to achieve the proper dissolution. During this process, a filtration system removes gypsum, clay, silica, and other acid-insoluble waste materials (USEPA, 1981a). This process is applicable only to high-grade ores, which do not contain lime or clay. No phosphate mining company in the central Florida phosphate district uses this process.

Because this process is still considered experimental and is not presently in use at any phosphate mine in the central Florida phosphate district, this option was dropped from further consideration. Therefore, a detailed evaluation of the relative impacts of the process is not included in this EIS.

2.2.4.2.2 Environmental Considerations

The primary environmental concern for beneficiation with the direct acidulation process is the potential for significant negative impacts on local air and water quality. The extensive use of sulfuric acid could result in a potential for acid emissions into the atmosphere and the receiving surface waters. Due to the clay content in the matrix, a significant amount of acid would be retained in the filter cake, and present potential for adverse ground and surface water impacts at the disposal site (USEPA, 1981a). Additionally, there is an increase in the amount of hazardous materials that are stored and used at the mine site.

2.2.4.2.3 Technical Considerations

Since the direct acidulation process is still experimental, little is known about large-scale product recovery and operation. Operational costs are expected to be high due to the rate of sulfuric acid consumption. Sulfuric acid consumption rates are estimated to be much greater than those of conventional beneficiation because of reactions of the acid with calcium and magnesium which are contained in the matrix (USEPA, 1981a).

2.2.4.3 Matrix Processing Summary

Presently, wet process beneficiation is the only viable method of phosphate ore processing in the central Florida phosphate district. Nearly all water used in the process is recycled for further use. Impacts on air quality are minor, and energy consumption is relatively low. Adverse impacts include the need for aboveground storage of waste clays and the potential, although remote, for dam failure. Direct acidulation requires grinding of the ore as well as reaction with sulfuric acid. It is only suited for high-grade ores with no lime or clay. This is an unproven, experimental process (USEPA, 1981a).

2.2.5 Plant Siting

2.2.5.1 Siting Considerations

Initially, mined matrix would be pumped to the Fort Green Mine Beneficiation Plant for recovery of the phosphate rock product. When economics warrant, a new beneficiation plant would be built at Ona, and the remaining matrix from the mine area would be processed through the new plant (IMC, 2002).

The Ona beneficiation plant would include a washer, sizing, flotation, reagent area, product storage, offices, shops, warehouse, rail yard, and water handling system. Processes may include all current technology for the recovery and upgrading of the phosphate rock to a saleable product from the phosphate matrix. There would be no chemical plant, gypsum stack, or rock drying facilities located at the Ona Mine. A conceptual layout of the Ona plant facilities is shown on Figure 2.2-3. Approximately 150 acres would be needed for the plant site. Siting a beneficiation plant involves a compromise between the following, somewhat competing, elements:

- The loss of phosphate resources under the plant location (site the plant in an area of low ore values);
- The cost and consumption of energy required for movement of water, ore, and waste products (site the plant near the center of the deposit that would be processed through it);
- The extent and cost of transportation and power to and from the plant site. This includes items such as railroads and the existing transportation network (for goods, services, product, and workers);
- The destruction of environmentally sensitive areas; and,

- Potential conflicts with the siting of the clay settling areas (IMC, 2002).

After consideration of the above elements, three potential plant sites were identified by IMC as shown on Figure 2.2-4, and listed below:

- Plant Site #1, the original site selected by MCC, which was located near the existing water supply wells. This site was eliminated because it is needed as a clay settling area;
- Plant Site #2, a site previously considered by IMC. This site was eliminated because of environmental considerations; and,
- The Ona plant site proposed by IMC.

Each of these three areas is described in the following sections.

2.2.5.2 Ona Plant Location (IMC's Proposed Action)

IMC's proposed location for the new Ona plant is in Section 25, Township 34 south, Range 23 east and Section 30, Township 34 south, Range 24 east, and is approximately 1,000 feet north of SR 64. This site is in close proximity to existing rail lines and roadways, thereby reducing the expense and potential loss of reserves associated with the construction of new facilities at the Ona site. Groundwater supply wells are proposed in the plant site area and pumping distances would be short. The site is close to the center of the property, and therefore, reduces pipeline transport system length and consequent power requirements. The plant would not be located where clay settling storage areas are needed, in an area of low ore value. Additionally, it is located outside of environmentally sensitive areas (IMC, 2002).

The proposed site presently consists of improved and unimproved pasture, with areas of live oak, shrub swamp, freshwater marsh, and upland hardwood-conifer mixed. The proposed site does not contain any unique or ecologically critical habitat, and substantial areas of similar habitat occur throughout the Ona site. Land clearing and preparation prior to construction of the beneficiation plant would result in the loss of natural habitat that might impact listed plant and animal populations. However, mobile species of wildlife are expected to migrate to adjacent undisturbed areas, while pre-clearing surveys would locate less-mobile individuals and plants that would be relocated to undisturbed areas prior to the commencement of construction (IMC, 2002).

2.2.5.3 Other Plant Locations Considered

The first area considered (Site #1 on Figure 2.2-4) was the site previously proposed by MCC because of its proximity to the existing deep wells. This site was eliminated by IMC early in the process when it became clear that this location or area would be needed for clay settling (IMC, 2002).

Site #1 is currently vegetated with a mixture of unimproved pasture, palmetto prairie, freshwater marshes, and mixed hardwood/conifer forests. It is immediately adjacent to a high-quality mixed wetland hardwood forest, contained within Conservation Area #9 in Section 17, and construction and operation of a beneficiation plant at this location could adversely impact the existing habitat for wildlife and listed plant species. Also, reclamation plans include the creation of a contiguous parcel of mixed wetland hardwood forest from Conservation Area #9 southward through Section 20 and into Section 29. This would not be as feasible if the plant were to be constructed at Site #1 (IMC, 2002).

The second location (Site #2 on Figure 2.2-4) is in an area close to existing roads and railroads. This location is within Area of Conservation Interest #11, which contains high quality forested wetlands and palmetto rangeland surrounded by contiguous natural plant communities. Site #2 contains shrub marsh, live oak, freshwater marsh, and temperate hardwood communities that IMC proposes to leave undisturbed. Thus, this location was eliminated from consideration (IMC, 2002).

2.2.6 Water Management

2.2.6.1 General Description

Because the mining and processing of phosphate requires significant quantities of water, it is an essential element of phosphate mining operations in Florida. Water is used to transport ore from the mine to the plant, to transport and process the ore feeds and products through the beneficiation plant, and to transport the waste products away from the plant to disposal sites (USEPA, 1981a).

Competition for water in Florida has prompted conservation measures on the part of all water users. As shown in Table 2.2-3, phosphate mines in Florida have responded to the pressures for reduced water consumption by reducing their withdrawals by nearly 56 percent since 1991. For the proposed Ona Mine, 96 to 98 percent of the water used in processing the phosphate ore is expected to be recycled (IMC, 2002).

IMC has estimated the amount of water consumed by the mining and processing, including the recycled water, to be 600 gallons per ton of product. For the first eight years of the mine life, phosphate rock production is expected to average 2.5 to three million tons per year. From the ninth year through 24th year, the production is expected to average five to six million tons per year. The water balance that was calculated recognizes that the Ona Mine initially would be an extension of the Fort Green Mine operation (IMC, 2002). Therefore, since the water systems are completely integrated, the water balance described in the CDA and summarized herein is for the Ona and Fort Green Mines, combined.

During the life of the mine, the drainage area captured by the Fort Green and Ona Mine re-circulation system would vary from 9,320 acres at the beginning, increasing to 13,257 acres in mid-mine life, and ending at 9,010 in the last year of mine life. It is not practical or necessary to develop a conceptual mine plan that is detailed enough to allow calculation of the drainage area corresponding to each dewatered pit (IMC, 2002).

The water budget presented in the CDA includes the rainfall and evapotranspiration (ET) from the drainage areas included within the recirculation system. Water entering the system from incident rainfall on the drainage areas is estimated based on historical rainfall at a Wauchula rainfall monitoring station to be 45,902 acre feet per year (acre-ft/yr). Water leaving the system as a result of ET is estimated by IMC to be 32,368 acre-ft/yr (IMC, 2002).

The three alternatives considered for process water sources were: 1) groundwater, 2) surface water, and 3) a combination of the two. IMC proposes a combination of groundwater pumping and surface water capture for the proposed project water sources. The Ona Mine water balance complies with the Areawide EIS recommendation that the mines reduce reliance on groundwater and use surface water as the primary source (USEPA, 1978).

2.2.6.2 Process Water Sources

2.2.6.2.1 Combination of Groundwater Withdrawal and Surface Water Capture (IMC's Proposed Action)

IMC's proposed water sources include both groundwater and surface water. Figure 2.2-5 is a graphical depiction of the mine water balance. The projected groundwater use demands for the Ona Mine project are presented in the CDA and are summarized in Table 2.2-4 (IMC, 2002). The sources of groundwater would include both potable and non-potable water pumped from the Floridan Aquifer System (FAS), either from existing wells at the Fort Green Mine or from existing wells or new wells proposed at the Ona site. Water captured from the mine re-circulating system would be the surface water source. Both the average annual and peak monthly groundwater demand is presented in Table 2.2-4. The average annual demand is based on historic annual average rainfall, and the proposed production rate of 2.5 to six million tons per year (IMC, 2002). The peak water demand is based on drought conditions and the same average production rate.

IMC is proposing to install three production wells (two for use, and one for standby) at the Ona site as permitted under the IMC's existing WUP No. 2011400.008. These wells would be used for makeup water to the recirculation system. Any water that is needed in excess of that available through the wells at Ona would be supplied by wells at the Fort Green Mine (IMC, 2002) through an inter-connected ditch system. The WUP sets limits on each well and total overall usage, giving IMC the ability to transfer water between the mines as needed. When the mining infrastructure (beneficiation plant, administrative buildings, etc.) is built at the Ona site, an additional three wells would be needed. These additional wells would be used for: 1) potable and sanitary needs; 2) utility water purposes; and, 3) fire protection needs. These additional wells would be incorporated into the existing water use permit when the facilities are being planned (IMC, 2002).

As a part of the WUP, Schreuder, Inc. performed an evaluation for the new use of water from the UFA. The evaluation was performed in 1995 and 1996, and SWFWMD subsequently issued the permit in June 1996. A review of the impacts of the proposed withdrawals is included in Section 4.5.1.5.

The majority of the water for the Ona Mine is required in the recirculation system to provide detention time for clay settling. The system allows the clays to settle out from the process water while providing a clear source of water for mining and processing. As stated in the CDA, for a detention time of 15 days and a re-circulation rate of 150,000 gpm, a minimum volume of approximately 10,000 acre-feet is needed (IMC, 2002). If lower volumes are in the recirculation system, the system can become less efficient separating clay and phosphate minerals. The change in storage for the mine recirculation system was calculated from a water budget analysis for the Ona mine. In the analysis, discharge from the system would only occur when the storage has reached it's maximum capacity of 10,000 acre-feet (see Section 2.2.6.3).

The water balance for the Ona Mine presented in the CDA is described in detail in Section 4.5 of this EIS. A summary is presented in Table 2.2-5. The analysis was performed assuming an estimated surface water catchment area based on the scheduled mining and reclamations areas that vary from 9,320 acres at the beginning, increasing to 13,257 acres in mid-mine life, and ending at 9,010 acres in the last year of mine life. The monthly water makeup requirements for the Ona Mine vary between zero and 17.46 million gallons per day (mgd), with an average annual of 4.61 mgd.

The amount of surface and groundwater contributions to the re-circulation system depends on the rainfall and available storage within the system. The mine water balance takes into account the available storage in the clay settling areas with the proposed construction and filling schedule. Other than limited storage in the mine cuts and the initial water storage pond at the Ona plant site, the clay settling areas are the primary water storage areas.

2.2.6.2.2 Surface Water Sources

Sources of surface water include the numerous on-site streams and the surface water capture of the rainfall catchment area. These are the only sources of surface water available and as such are the only sources considered for the surface water use-only alternative. IMC does not propose to use any source of surface water that flows on, through, or near the site as a source of water. There is no water impoundment to serve as a source of process water for the Ona Mine. The difference between the captured rainfall and the evaporation and ET losses would be used as the surface water makeup source in the recirculation system.

No alternate sources of surface water are available as a reliable source of makeup water for the mining system. As stated in the MCC EIS and based on field measurements presented in Section 3.5, the quantity of water in surface water streams varies throughout the year with the seasonal weather patterns (USEPA, 1981a). Thus, an alternate source of makeup water is needed for continuous supply to the recirculation system. Capturing surface water for the recirculation system as proposed by IMC is the only available method that can be used to provide this supply. However, it is insufficient to provide all of the makeup water needed, but it does reduce the amount of groundwater that is needed. The ratio, based on the average annual water budget, of surface water captured to groundwater withdrawals is approximately 2.7:1.

2.2.6.2.3 Groundwater Sources

The three major sources of groundwater from the site location are: 1) the surficial aquifer system (SAS); 2) the intermediate aquifer system (IAS); and, 3) the upper Floridan aquifer (UFA). These three water bearing zones have different physical characteristics and water chemical properties. The SAS is of low yield and extraction is typically used for local irrigation, limited domestic use or construction dewatering (SWFWMD, 2000b). The IAS is a more permeable zone than the SAS, but the typical yield from this system varies throughout the water-bearing zone. The IAS is considered a leaky-confined aquifer; well yields are typically from 50 to 500 gpm (Wilson, 1977). Typical uses of the IAS are for public supply, domestic use and irrigation (SWFWMD, 2000b). The UFA is the principal source of water in the SWFWMD region (SWFWMD, 2000b). Wells developed in the UFA yield large quantities of water, often in excess of 1,000 gpm.

Technical Considerations

The primary advantage of using groundwater as a makeup water source is that the available supply is less dependent on the amount of rainfall for any given year. The withdrawals from the UFA are permitted by the SWFWMD, and as such have already given approval to IMC for the WUP.

Environmental Considerations

The amount of water that is entrained in the waste clays directly influences the amount of makeup water needed, as it is the primary user of water. As explained in the CDA, the entrainment of water into the waste clays accounts for approximately 40 percent of the overall water use budget (IMC, 2002).

As described in Section 3.5, onsite surface water supplies are not sufficient to provide an adequate source of all makeup water. Providing all of the makeup water from the UFA would not be a realistic option because it would increase water level drawdown in both the UFA and the IAS, thus potentially having adverse impacts on nearby users (USEPA, 1981a). Furthermore, use of only groundwater for all of the makeup water is inconsistent with the phosphate industry's reduction in groundwater use since 1991 (see Section 2.2.6.2.2).

2.2.6.2.4 Process Water Summary

Withdrawing all of the needed process water from surface waters is not a feasible alternative because the amount is greater than the available supply. Withdrawal of all of the needed water from groundwater could be accomplished, but this could potentially lower the UFA water levels and it would be contrary to the Areawide EIS recommended reductions in groundwater use that have been made by the phosphate mining industry since 1991. Thus, a combination of water storage and groundwater withdrawal is proposed by IMC. At present, IMC is permitted by the SWFWMD to withdraw an average of approximately 12.0 mgd, with a maximum of 16.0 mgd, from the Ona wells. In approving this WUP application, the SWFWMD has determined that no adverse groundwater impacts would occur at the property boundary. Increases in the storage capacity would reduce the groundwater need while reducing discharges to surface waters, since the mine would have additional capacity to retain rainfall runoff (IMC, 2002).

2.2.6.3 Excess Water Discharge

IMC's proposes to discharge excess water to the surface water drainage system. This excess water would be accumulated from rainfall events and contributing runoff in the re-circulation system, primarily during the wet season of the year. The water has to be released to preserve the freeboard requirements of the clay settling areas. IMC proposes to maintain baseflow in streams by maintaining the groundwater levels at the stream boundaries (IMC, 2002).

The amount of water available from precipitation is greater during the wet season of the year (June to October) when the amount of rainfall exceeds the losses due to evaporation and transpiration (collectively ET). The opposite occurs during the dry season. Based on IMC's water budget analysis performed for the Ona site (see Section 4.5), it is estimated that the excess accumulation would average about 4.4 mgd with a maximum of about 90.9 mgd. The excess discharge would be discharged (IMC, 2002).

2.2.6.3.1 Surface Water Discharge (IMC's Proposed Action)

Figure 2.2-5 presents a schematic diagram that illustrates water needs for the mine and beneficiation process. These are further described in Section 4.5. Figure 2.2-6 shows the locations of the proposed National Pollution Discharge Elimination System (NPDES) outfalls to Horse Creek (Discharge 005 and 006) and Brushy Creek (Discharge 007, 008, and 009). The outfalls would be designed for both low and high flow conditions and would allow for flow measurement. The outfalls would also be constructed to dissipate energy to reduce the potential for erosion. Based on the monthly water budget analysis presented in the CDA, the discharge flows are estimated at 4.4 mgd on average, with a maximum of approximately 90.9 mgd. Discharging to Horse and Brushy Creeks during periods of heavy rainfall would provide some offset to the reduction in stream flow from mining activities in respective drainage basins. The quality of the discharged water from the mining of the Ona site is expected to be in accordance with the results from analyses of the primary pollutants of concern presented in Section 4.6 of this document.

Both Brushy and Horse Creek are Class III surface water bodies at the point of discharge. The quality of the discharges would be regulated by the NPDES effluent limitations. Table 2.2-6 presents the range of water quality characteristics expected in the discharges. A comparison of the summary of receiving stream water quality and the expected discharge quality (Table 2.2-6) indicates that the discharges into Horse Creek and Brushy Creek are expected to cause an increase in pH, conductivity, dissolved oxygen, and sulfate concentration, and a decrease in total nitrogen and fluoride concentrations (see Section 4.6.1.1.1 for detailed analysis). However, the net result is expected to meet the water quality standards in the receiving streams (see Section 4.6) (IMC, 2002).

The proposed discharge points are located based on their proximity to the clay settling areas. No apparent operational or environmental advantage would be expected from discharging the excess water to streams other than those proposed.

2.2.6.3.2 Zero Discharge

Under this alternative, all excess water would be contained on site, and there would be no discharge to surface water. The height of the clay settling area retaining dams would be increased to increase the volume that could be contained. The settling areas would be designed to retain a specific rainfall event such as a 25-year, 24-hour storm. To maintain dam safety, higher rainfall amounts would be discharged as described in Section 4.17. During periods of non-operation and at the end of mine operation (while reclamation is ongoing), there would be no consumption of water by the clay or product. Thus, once the storage areas are filled, additional water within the recirculation system would have to be discharged directly, or pumped to another mine for discharge. Also, with higher embankments, the post-reclamation topography would not be close to the original topography and would impact future land use. This option is not technically feasible due to the storage size required (entire site). Since having a zero discharge facility is not a viable alternative, this option was not studied in detail in this EIS.

2.2.6.3.3 Excess Water Discharge Summary

The proposed discharge to surface water would be at outfall points permitted under the NPDES to Horse and Bushy Creeks. The discharge flows are estimated at 4.4 mgd on average, with a maximum of about 90.9 mgd. The estimated quality of the discharge would be expected to increase pH, conductivity, dissolved oxygen, and sulfate, and decrease total nitrogen and fluoride in the receiving creeks, but not above water quality standards. It appears that surface water discharge at other locations would offer no significant environmental advantages over the proposed locations. Having no discharge throughout the life of the mine is not practicable.

2.2.7 Sand and Clay Residuals Management

An important part of the planning of a phosphate mining operation is the selection of the waste disposal methods to be used. The phosphate beneficiation process from the Ona Mine would produce large quantities of waste sand tailings and clay for disposal. Extensive planning is required to minimize adverse impacts on the environment, the mine and plant operations, and the development of appropriate land reclamation for future alternative uses. Aesthetics and various regulatory requirements are other factors that must also be considered in preparing a waste disposal plan (USEPA, 1981a).

IMC has proposed a conventional waste disposal method for the Ona Mine that includes above ground clay settling ponds. However, various state and federal agencies have historically expressed concerns on the above ground approach to clay disposal. Reducing above ground clay storage was recommended in the Areawide EIS (USEPA, 1978).

Alternative methods for waste disposal have also been considered for the Ona Mine. Each of these options is describes in further detail below. Figures 2.2-7, 2.2-8, and 2.2-9 show typical cross sections for conventional clay disposal, sand/clay disposal, and clay disposal with sand/clay cap options, respectively. A significant technical reason why these methods are not appropriate is the low ratio of sand to clay for the Ona Mine. The Sand/clay mix approach typically requires a minimum ratio of two parts sand to one part clay (sand/clay ratio of 2:1). The ore at the Ona Mine has a sand/clay ratio of about 2.18:1, and some of the sand has to be separated for use in constructing impoundment embankments. The resulting sand/clay ratio would approach the minimum ratio for effective sand/clay mix deposition. Another alternative that has been considered is use of the sand/clay cap (IMC, 2002).

2.2.7.1 Conventional Method (IMC's Proposed Action)

2.2.7.1.1 System Description

The conventional waste disposal method has been traditionally used by the central Florida phosphate industry. With this method, there are separate sand and clay waste streams from the beneficiation plant for disposal. Based on the annual production rates presented in Table 2.2-1, the mine is expected to produce 170 million dry tons of clay waste and 370 million dry tons of sand during the life of the mine. Generally, there has not been a concern with the disposal of sand tailings by the phosphate industry. The sand tailings are typically used to backfill mine cuts and develop the post-mining topography. The proposed post reclamation topography and re-vegetation plans are used to prepare the sand backfill plan (USEPA, 1981a).

However, a more complex problem has been the disposal of waste clays since they contain a large amount of process water and require large areas and extended time periods to settle and consolidate. The beneficiation plant discharges clay slurry, which is three to five percent solids, into a clay settling area. After a number of years of stage filling, IMC is estimating consolidation to about 29 percent solids upon completion, which would result in an increased volume of 71 percent from retained moisture. Because of this water retention, above ground clay settling area impoundments are required (USEPA, 1981a; IMC, 2002).

The land area for the clay settling at the Ona Mine is estimated to be 6,269 acres, which includes 4,602 acres for clay storage and 1,667 acres for the footprint of the dikes. The minimum dike height above natural grade is estimated to be 45 to 55 feet. IMC proposes nine impoundment areas that would range in size from 373 acres to 695 acres, and range in volume from 26,100 acre-feet to 59,100 acre-feet. IMC is proposing to stage-fill these clay-settling areas, an approach where clay is placed and allowed time to settle before more clay is added. This technique would result in an overall higher settled density of the clay than without the stage approach and thus results in an overall reduction in the size of the clay settling areas. Over the life of the Ona Mine, the total capacity of the proposed impoundments is 351,300 acre-feet (IMC, 2002).

The 351,300 acre-feet of clay settling area capacity was determined from the clay consolidation model as being the capacity that would be required to store the clay and provide for process water storage for the Ona Mine. This model included the current operations, and the existing Fort Green Mine, and all of the properties that will be mined from the present through Ona. This included the North Pasture, Fort Green Southern Reserves, Manson-Jenkins, and Ona tracts. As noted, some of the Ona clay would be stored in Fort Green, and Manson-Jenkins CSA's, and some of the clay from Manson-Jenkins would be stored in the Ona O-1 ponds during the early part of the Ona Mine life.

Sand tailings would be used to create both upland and wetland natural systems, row crops, pasture and citrus. A portion of the sand would also be used to create dams for the clay settling areas. However, during the first half of the mine life, there would not be sufficient mine cuts to dispose of the waste sand produced. Therefore, during this period waste sand would be stockpiled in six storage piles on the site. The locations of these storage piles are shown in Figure 2.2-10. During the second half of the mine's life, this sand would be used for the proposed reclamation. Any sand in excess of that needed for reclamation would be considered for sale (IMC, 2002).

Preliminary testing by IMC has shown that adding flocculants may provide final consolidation that might reach a higher density than would be achieved without the flocculent. IMC is currently running production scale tests with flocculants to determine if the method has economic or logistic advantages. IMC indicates that these tests will take several more years before results are conclusive (IMC, 2002). Environmental Considerations

There are environmental advantages and disadvantages associated with conventional waste disposal methods as follows (USEPA, 1981a):

Advantages

- Approximately one-third of the phosphate is in the clay as fine particles and is unrecoverable with current technologies. This method provides the potential for future phosphate recovery since the clays are not diluted with sand;
- The settling areas provide for surface water capture storage capacity, which reduces the groundwater withdrawal requirements;

- Successful settling area reclamation has been achieved in the phosphate industry; and,
- Tailings fill areas provide good soil strength, which do not restrict future land use.

Disadvantages

- If dike failure occurs, there is a potential for release of the clay to the surface water and potential loss of biological resources;
- Large areas are needed for the clay settling;
- The land has more limitations on potential uses after reclamation because of low soil strength;
- The clays need extended time periods to settle and release water;
- Drainage basin restoration is difficult because of the final elevations of the settling areas are above grade and the areas cannot be readily re-graded; and,
- Clays exposed at the surface of settling areas typically have higher radiation levels than other reclaimed areas. However, the radiation levels are below human health risk levels and discharges meet class III water quality standards.

2.2.7.1.2 Technical Considerations

The disposal of clay and sand tails separately is an operationally proven method. This method provides areas for the storage of water and accumulation of rainfall. The groundwater withdrawals and surface water discharges are reduced because of the increased accumulation of rainfall provided by the large impoundment areas. The conventional method also allows for the recovery of the phosphate contained in the reclaimed waste clays if extraction technology is developed in the future (USEPA, 1981a).

One of the characteristics of waste clay settling areas is low soil strength. Since the consolidation of the clays continues for an extended period of time, one method to improve soil strength is by capping the clay areas with a more stable soil. Another method is to incorporate stage settling. This would reduce the surface area that is covered by clay. In order to achieve a higher percentage of clay solids, the deposition of the clay is rotated among several settling areas. Additional compaction is achieved by periodically withdrawing water from the surface of the settling area. This method would achieve consolidation with a higher percent of solids (USEPA, 1981a).

2.2.7.2 Sand/Clay Mixing Method

Sand/clay mixing for waste disposal has been recommended by the Areawide EIS whenever possible (USEPA, 1978). This method has been employed at a full-scale mining operation by CF Industries for over a decade.

2.2.7.2.1 Description

With this method, sand and clay are mixed together before being routed to a common disposal area. The minimum ratio that is considered technically feasible for good mixing is two parts sand to one part clay (sand/clay ratio of 2:1). Several methods have been used to combine the sand and clay wastes for disposal. These include the dredge-mix method, the use of chemical flocculants, and the sand spray process (USEPA, 1981a). The sand spray process has proven to be infeasible.

With the dredge-mix method, settling ponds are constructed for waste clay slurry to enter at three to five percent solids. After settling for a period of about six months, the clays would reach a 12 to 14 percent solids content. The thickened clays are then mixed with sand and pumped to a mined out area with a perimeter dam to allow for aboveground fill. The areas are typically planned for final subsidence to be near natural grade. The perimeter walls are used to shape the final contour of the disposal area. To use this method it is necessary to have a minimum of two thickening ponds (USEPA, 1981a). The dredge-mix method has been employed at a full-scale mining operation by CF Industries for over a decade.

With the flocculant method, the consolidation of waste clays is greatly accelerated by the addition of chemical flocculants. The clay wastes are rapidly dewatered from flocculants being added to the sand/clay mix. This method mixes the clay slurry at three to five percent solids with the sand tailings and the flocculant. This mix is then sent to a thickener where the solids content is raised to about 12 to 15 percent to keep the sand in suspension. The material is then pumped to the disposal site for settling (USEPA, 1981a). This process has subsequently been proven to be no better than the dredge-mix process.

With the sand spray process, clay slurry at three to five percent solids is pumped into the mined-out areas in order to settle to 12 to 15 percent solids. Next, a layer of sand tailings is deposited over the clay by a floating/suspended pipeline equipped with spray nozzles. After further clay consolidation has occurred, the clay waste is covered with another layer of clay and then sprayed with sand. The process continues until the desired level of fill is achieved (USEPA, 1981a).

2.2.7.2.2 Environmental Considerations

The sand/clay mixing approach has both advantages and disadvantages as follows (USEPA, 1981a):

Advantages

- Reduced amount of above-grade settling areas and lower embankment heights compared to the conventional method; and,
- Slight reduction of radioactivity at the surface of the clay settling areas compared to the conventional method.

Disadvantages

- The potential recovery of phosphate from the clay wastes in the future is diminished;
- Storage and catchment of rainfall is reduced because of the smaller settling areas;
- Most of the site is covered with clay disposal areas, with the low soil strength, restricting future land use;
- The sand and clay tend to separate if the clay is below 16 percent of the mix, thus it is difficult to achieve a true mix;
- Supplemental water requirements are increased;
- Discharge volumes are increased;
- A minimum of two thickening ponds are needed, and;
- The tailings are all used in the mix, thus reducing the opportunity to reclaim xeric communities.

2.2.7.2.3 Technical Considerations

The sand/clay disposal method is not considered the preferred alternative for use on the IMC site for one primary reason. The resulting soil (high clay content) places significant post mining land use restrictions due to its low strength (as compared to sand tailings fill and graded overburden). The clay soil also restricts the type of habitat that can be created, not allowing xeric communities. This method would severely restrict post mine land development for residential, or commercial uses. As such this reclamation option is not studied in detail in this EIS.

2.2.7.3 Conventional Disposal with Sand/Clay Capping

Both the conventional and the sand/clay mix methods are incorporated in this waste disposal method. With this method, sand and clay is initially deposited separately. After the clay has settled sufficiently, a sand/clay mix or sand tailings with overburden cap would be deposited over the surface of the settled clay (USEPA, 1981a).

2.2.7.3.1 Environmental Considerations

Because this method combines the conventional and sand/clay mix methods, many of the environmental considerations described in Sections 2.2.7.1.2 and 2.2.7.3.2 would apply. Additional advantages and disadvantages of this method are (USEPA, 1988):

Advantages

- Except for the cap itself, the potential recovery of phosphate from the clay wastes in the future remains an option;
- Depending on the thickness of the cap, the final surface contours could be closer to grade;
- The surface layer would have increased soil stability; and,
- Compared to the conventional method, there would be increased water recovery.

Disadvantage

- Reduced size of sand tailing areas, which are more stable, and;
- High cost of placing sand cap.

2.2.7.3.2 Technical Considerations

Studies have shown that a problem with the use of the sand cap is the insufficient bearing capacity of the clay to support the cap (FIPR, 1989). The pressure of the sand on the surface of the clay waste can cause clay to be forced up through the sand to the surface of the disposal area. For this reason, this technique has been considered infeasible and is not evaluated in detail throughout this document.

2.2.7.4 Sand and Clay Residuals Management Summary

The sand/clay mix option is not desirable due to future land use options. The addition of flocculants is presently in the experimental stage. The sand cap method is technically infeasible. Experience has shown that the sand tends to punch through and thus a lot of additional sand is required to create a stable surface. This can cause the ultimate land elevation to be significantly higher than with the conventional method. Additionally, the ability of the area to support building construction without piles is not improved. Therefore, with the present technology, the conventional stage filling method of waste disposal is IMC's preferred method.

2.2.8 Reclamation

The Ona site is currently vegetated with a mixture of improved pasture surrounded by native vegetation in the form of rangeland, upland forests, and herbaceous and forested wetlands. The objectives of the reclamation plan are to restore the land that has been disturbed to a mixture of landforms as desired by IMC, the landowners, and the work groups that participated in the CDA process. In addition, the reclamation plan must meet all the requirements of Chapter 62C-16, F.A.C. (1996) and Section 2.06.06C of the Hardee County Land Development Code (LDC) (Hardee County, 1998).

All of the Ona site that is mined or disturbed would be reclaimed. Table 2.2-7 shows that of the total 20,676 acres on the site, 15,836 acres would be disturbed and reclaimed and 4,839 acres would not be disturbed by the mining activities. All 15,836 acres that are disturbed would be reclaimed when the mining use of the land is completed (IMC, 2002).

The annual average reclamation rate is based on the total area mined and disturbed (15,836 acres) divided by the reclamation period (year three through year 29, or 26 years), which equals an average of 610 acres per year (acres/year). The precise schedule is based upon the end of mining use for each area, and the type of reclamation landform to be used as presented in Table 2.2-8. In this table, reclamation is considered finished at the completion of re-vegetation with one year growing time (IMC, 2002). The application of this schedule is found in Table 2.2-9, which is based on the example plan shown on Figure 2.2-11.

The proposed land use for the Ona site after reclamation would be primarily agricultural (as is its current land use), supplemented with wetlands and wildlife habitat. Table 2.2-7 shows the various types of vegetation cover proposed. All vegetation communities in the 300, 400, 500, and 600 Florida Land Use Cover and Forms Classification System (FLUCFCS)-85 series are suitable for use as wildlife habitat (see Appendix B for a List of FLUCFCS Land Use and Cover Classifications). Sections 4.3 and 4.4 include a more detailed description of reclamation habitats.

Once mining is completed, the land would revert back to the same status it currently has under the Hardee County LDC, and would be controlled by normal land use decisions. The potential for future uses would be quite varied. The Reclamation Plan has positioned various features in consideration of potential future use. Section 4.2 describes the reclamation features for vegetative cover in more detail.

2.2.8.1 Conventional (Separate Sand and Clay Disposal) (IMC's Proposed Action)

As presented in the CDA, IMC proposes to use conventional reclamation methods consisting of crustal development for clay settling areas, sand tailings fill areas with overburden cap, and reshaped overburden soils for land and lakes (IMC, 2002). The proposed post-reclamation landforms are shown in Figure 2.2-11 and the vegetation is presented in Figure 2.2-12.

IMC's proposal to reclaim the Ona site clay settling areas is summarized in Table 2.2-9. This table includes the filling schedule for an integrated clay disposal plan for the Fort Green and Ona Mines. IMC's proposed tailing disposal schedule is presented in Table 2.2-10. The right hand column of the table shows the acreage shortfall for tailings disposal (negative values) and excess acreage available for tailings disposal (positive values) for the life of the mine.

2.2.8.1.1 Crustal Development for Clay Settling Areas

The reclamation of the clay settling areas would be by the crust development method. IMC has successfully reclaimed numerous settling areas by this method in other counties. Clay settling areas are kept in use only as long as they are needed to maximize clay content. At the end of their use, perimeter and internal ditches are installed to drain surface water. This promotes drying and shrinkage of the clay. When this progresses sufficiently to remove areas of standing water from the surface, the area is "abandoned" per Chapter 62-672 F.A.C. (1999). Light vehicular traffic is expected after about five years from the initial clay pond filling. After abandonment, the dams are recontoured to create a more natural landform appearance. The surface is then cleared, and the desired vegetation, usually pasture grasses, are planted (IMC, 2002).

Although the plan shows most of these areas being reclaimed to improved pasture, many other agricultural uses are appropriate, and should be considered as acceptable options. For simplicity of analysis, IMC has shown improved pasture (211) for the clay pond areas, except in areas where shrub and brush are proposed primarily along dike locations, for forest rims around wetlands, and in locations where shrub marsh is proposed for wetland areas (IMC, 2002).

2.2.8.1.2 Land and Lakes

The land and lakes areas would be reclaimed by regrading available overburden to designed bottom and shoreline contours. All of the lakes to be created on the Ona site would be constructed in accordance with the requirements of Chapter 62C-16 F.A.C. (1996), which imposes specific requirements to include littoral zones, or shelves, and zones of fluctuation. Specifically, at least 25 percent of the high water surface area of each lake would consist of a zone of fluctuation that would be vegetated with emergent and wetlands and transitional vegetation. Also, at least 20 percent of the low water surface area would consist of water less than six feet deep to provide fish bedding and submerged vegetation zones (IMC, 2002).

In addition, protection from the introduction of low quality storm water is provided by the construction of an upland swale, a forested buffer zone or a combination of the two (IMC, 2002). The open water habitat, bank access for fishing or other activities and adjacent shady areas provide recreational opportunities. The design should feature a combination of water depth, a diversity of littoral zone vegetation and edge contours similar to natural lakes. All of these features are compatible and they are incorporated in concept into the design of the lakes proposed for the Ona site.

Figure 2.2-11 illustrates that some of the lakes would be located adjacent to undisturbed wildlife corridors and reclaimed natural systems. These lakes, in particular, offer benefits to native wildlife ranging from, at a minimum, water supply during periods of drought to habitat that can be used for nesting (the lakes would have islands that would be planted with trees for use as wading bird rookeries). Most of the proposed lakes are positioned away from internal habitat corridors so that any future development would not compete with wildlife. Although not identical, the open water habitat offers habitat value similar to deep water, or open water marshes.

2.2.8.2 Sand Tailings with Overburden Cap

The elevation of tailings fill areas would typically be close to natural grade before a layer of overburden is applied. These areas would provide good structural stability for building construction. As shown in Table 2.2-8, reclamation would generally be completed within a three-year timeframe once the tailing sand is placed.

2.2.8.2.1 Environmental Considerations

The conventional reclamation alternative has both environmental advantages and disadvantages as follows (USEPA, 1981a; IMC, 2002):

Advantages

- Post-reclamation land uses would be similar to uses on surrounding properties;
- There are no natural lakes in Hardee County, and the lakes would provide potential recreational opportunity;
- Soil fertility in waste clay areas would be improved over existing soils for agricultural land use; and,
- Sand hill and xeric habitats can be created with the sand tailings.

Disadvantages

- Topography and post-reclamation elevations in clay settling areas could significantly differ from the existing conditions;
- Above-grade clay disposal dikes would remain visible following reclamation;
- Post-reclamation elevations and topography would alter surface water drainage patterns within the sub basins; and,
- Radioactivity levels in clay settling area soils would be generally increased over existing conditions.

2.2.8.2.2 Technical Considerations

The consolidation time required for adequate settling determines the schedule for reclaiming clay settling areas (USEPA, 1981a). As shown in Table 2.2-8, a four-year period is allowed for surface drainage and crusting. This is followed by an additional three-year period of active reclamation involving further dewatering and consolidation procedures, grading and capping, and establishment of a plant covering.

Once mining and sand fill (if applicable) is completed in an area, the sand tailings fill and land-and-lakes areas require two years of reclamation, eighteen months for earthmoving and six months for revegetation (62C-16 F.A.C.).

The goal of reclamation on the Ona site is to economically restore all disturbed areas to a productive state, considering both existing and created environmental systems. Table 2.2-7 provides a breakdown of the existing and proposed land use and vegetation cover after reclamation.

2.2.8.3 Sand-Clay Mix Reclamation

The sand/clay mix reclamation alternative is described in Section 2.2.7, concluding that it is not feasible for the Ona Mine. As such, this reclamation approach is not feasible, and therefore, has not been studied in detail in this EIS.

2.2.8.4 Sand or Sand-Clay Cap

With this method, the conventional method of disposal of waste clay in settling areas would be combined with the disposal using sand or sand/clay mix. As described in Section 2.2.7, this approach would involve the placement of sand or sand/clay cap over the clay after sufficient settling has taken place to begin to support the weight of the cap material. The sand/clay cap method would involve dredging of thickened clay from the bottom of a settling area for mixing with sand to form a cap. The mixture would then be pumped over the consolidated conventional clay area to enhance the consolidation process. FIPR research on capping concluded that higher sand/clay ratios (6:1) produced higher clay solids in the underlying clay layer (FIPR, 1988a). The estimated capping mixture for the Ona Mine would be at a 6:1 sand/clay ratio.

This technique has not been adequately developed to consider it technically feasible on a full-scale level, and therefore has not been studied in detail.

2.2.9 Product Transport

Once the phosphate rock has been processed through the beneficiation process, it is ready to be transported to chemical plants, shipping terminals and/or ends users of the phosphate rock. Three processes for transporting (rail, truck, and conveyor) the phosphate rock have been considered.

2.2.9.1 Rail Transport (IMC's Proposed Action)

Railroads are a significant component of the established transportation system in central Florida. IMC proposes to ship the phosphate rock by rail service from its beneficiation plant (existing and proposed plants) to existing concentrates/fertilizer plants in Polk County and to shipping terminals (IMC, 2002). The Areawide EIS stated that the typical method for the transport of bulk phosphate rock is with the use of railroad dump cars (USEPA, 1978). IMC proposes to use this method of shipment from the beneficiation plant to existing processing plants in order to minimize transportation cost and the need to develop new transportation/conveyance systems to the processing plants. This proposed transportation method would take advantage of the existing transportation system. For the proposed shipment of the phosphate rock from the beneficiation plant to the users of the phosphate rock, no major construction of railroads is anticipated.

The shipment of phosphate rock is accomplished by loading the wet phosphate rock into open top, bottom discharge hopper rail cars for delivery. IMC anticipates approximately 170 rail car loads of the phosphate product to be shipped daily, which is the equivalent of two or three train loads. The rock would be shipped on the same route that is currently being used for the production from the Fort Green Mine, entering the CSX Transportation railroad mainline at a point about 12 miles further south from the current entry point (IMC, 2002).

2.2.9.1.1 Environmental Considerations

The shipment of phosphate rock by rail transport is considered the most economical and environmentally efficient manner to be moved between large distances over land (USEPA, 1981a, USEPA, 1988). The network of railroads in the central Florida area has long been established and IMC does not anticipate, with the exception of a spur to the proposed Ona beneficiation plant, any new construction for the Ona Mine. The main disturbances to the local transportation system would occur at highway railroad crossings during the crossing of a train. Trains create additional noise disturbances along the right-of-ways from the beneficiation plant to the destination of the phosphate rock. This should not be a significant impact due to the rural nature of the area and the fact that the trains would be displacing existing traffic from the Fort Green plant.

2.2.9.2 Truck Transport

This alternative would comprise the use of common diesel-powered transport trucks to haul the phosphate product to the existing concentrates/fertilizer plants over existing highways. This would require approximately 660 truckloads per day to be continuously shipped throughout the mining operations. Truck transport of the product is planned for cases when rail service is not available (such as work stoppages or customers not having rail delivery capability). Additionally, most if not all sand would be moved by truck.

2.2.9.2.1 Environmental Considerations

The use of diesel powered transport trucks for the shipment of the phosphate product from the beneficiation plant to the chemical plants for further processing would have some environmental impacts. The potential impacts of using this transport method would be the increase in noise and air pollution.

2.2.9.2.2 Technical Considerations

Technical considerations include an increase in heavy vehicular traffic, safety, efficient product transport, and roadway capacity. Truck transport of phosphate materials would require an evaluation of the projected level of service (LOS) on the existing roadways outside the mine area. The existing roadways must be able to accommodate the increase in traffic. This analysis has already been conducted for transporting sand tailings by truck. Another consideration is the quality of the existing roadway pavement and the potential for its degradation over time with the increased truck traffic. The primary disadvantages of using truck transport are the higher shipping cost, the increased noise levels in the traveled communities, and the increased air emissions. The main advantages of using the truck transport alternative would be the flexibility it provides.

2.2.9.3 Conveyor Transport

This alternative would comprise the use of a closed conveyor system to ship the phosphate product to the existing processing plants. A conveyor system is a complex set of mechanical components that support and advances a belt system. The phosphate rock would be continuously carried by the conveyor to the processing plants of New Wales and South Pierce, with a portion of the product delivered to the ports in Tampa. The conveyor would be about 48 inches wide with transfer points and motors spaced throughout the length to supply the required power. The distance the conveyor would traverse, the need to obtain right of way for the corridor, and the crossing of roads, rail lines, streams, etc., are disadvantages for this system. These disadvantages all lead to a very high cost (IMC, 2002).

2.2.9.3.1 Environmental Considerations

The phosphate rock would be placed onto the conveyor system directly from the beneficiation plant, and as such, the phosphate rock moisture content would be approximately ten percent. This moisture content does not describe the phosphate rock as slurry; therefore, the potential for uncontrolled release from spillage of the phosphate rock into surface waters would be reduced. Nonetheless, proper safeguards would be necessary for any stream or road crossing. An increase in particulate levels would probably be observed at the conveyor transfer points. This increase in particulate levels may have a localized effect, at the transfer points, on the ambient air quality depending on the moisture content at each particular location.

2.2.9.3.2 Technical Considerations

The primary obstacles of a conveyor system that would transport the phosphate rock a minimum distance of 22 miles are: rights-of-way, power for the system, and operation and maintenance of the system. These obstacles make this option not viable. Therefore, it has not been studied in detail in this EIS.

2.3 ISSUES AND BASIS FOR CHOICE

An intensive public and agency scoping process involving numerous meetings and field trips, contributed to the development of IMC’s Proposed Action. Initially IMC proposed to mine 17,593 acres of the entire 20,676 acres at the Ona site. Between August 1999 and February 2000, AWG and PWG members attended additional meetings and site tours. As described in Section 2.4.3, these groups identified “areas of conservation interest” (see Figure 2.1-2), and suggested an alternative to mine only 12,969 acres, and preserve the rest of the site.

To address the concern over preserving areas of conservation interest, IMC's developed the Compromise Area Alternative, which would disturb approximately 15,836 acres of the Ona site. This alternative would not disturb 1,448.7 acres of wetlands, or about 36 percent of all wetland areas on the site. In addition, mining related activities would not disturb 30.7 acres of open water, 3,359.2 acres of uplands, and one acre of barren land or roadways, for a total of 4,839 acres or about 23 percent of the entire Ona site. This total includes lands considered as "areas of conservation interest," as well as land within property line setbacks or natural and improved lands that are not economically mineable. The “areas of conservation interest” include xeric forests, pine flatwoods, palmetto prairie, and wetlands.

IMC proposes the Compromise Area Alternative as a balance between the need to minimize impacts to important natural habitat types, and the need to extract and beneficially utilize the geologic phosphate rock resource. This is IMC’s preferred alternative.

2.4 ALTERNATIVES ELIMINATED FROM DETAILED EVALUATION

2.4.1 Total Property Orebody

Under this alternative IMC would mine all areas containing recoverable phosphate. This would include mining 20,028 acres, and recovering approximately 130 million tons of phosphate rock based on an average acre containing approximately 6,500 tons of phosphate rock. However, IMC did not propose to mine certain parts of the site because of environmental constraints and current regulatory requirements.

2.5 COMPARISON OF ALTERNATIVES

A brief summary of potential impacts of each alternative on various environmental resources is provided in Table 2.5-1.

Table 2.5-1 - Comparison of Potential Impacts by Alternative					
Environmental Considerations	**No Action Alternative**	**Compromise Area Alternative (IMC's Proposed Action)**	**No USACE Jurisdictional Wetlands Impacts Alternative**	**IMC'c Original Area to be Mined**	**Natural Systems Group Recommended Areas of Conservation Interest**
Vegetation	Potential for impacts from urban and agricultural development with minimal regulatory oversight.	Temporary adverse impact. Site clearing in preparation for mining operations would result in the direct loss of vegetative communities. This loss is not considered permanent, as the total acreage of most vegetative communities would be restored during post-mining reclamation. Major changes would be the addition of several large lakes on the eastern side of the property.	Temporary adverse impact similar to proposed action, but on a smaller scale since only 1,122 acres would be affected.	Temporary adverse impact similar to the proposed action, but on a larger scale as this alternative would disturb 17,593 acres. The majority of lands proposed to remain undisturbed include the floodplains associated with Horse and Brushy Creeks. Loss of habitat is not considered permanent, as post-mining reclamation would restore existing vegetative communities.	Temporary adverse impact similar to the proposed action, but reduced in scope from 15,836 acres to 12,969 acres.
Wetlands	Potential for impacts from urban and agricultural development with minimal regulatory oversight.	Temporary adverse impact with 2,765 acres (56.4 percent) of USACE jurisdictional wetlands impacted, 2,136 acres (43.5 percent) undisturbed and 3,918 acres reclaimed (23.5 percent increase in pre-mining acres).	No adverse impact.	Temporary adverse impact similar to the proposed action but on a larger scale with 3,688 acres (75 percent) of USACE jurisdictional wetlands impacted and 1,213 acres (25 percent) undisturbed.	Temporary adverse impact similar to the proposed action, but with 1,988 acres (41 percent) of USACE jurisdictional wetlands impacted and 2,913 acres (59 percent) undisturbed.

Table 2.5-1 - Comparison of Potential Impacts by Alternative

Environmental Considerations	No Action Alternative	Compromise Area Alternative (IMC's Proposed Action)	No USACE Jurisdictional Wetlands Impacts Alternative	IMC'c Original Area to be Mined	Natural Systems Group Recommended Areas of Conservation Interest
Fish and Wildlife Resources	Potential for impacts from urban and agricultural development with minimal regulatory oversight.	Temporary adverse impact to aquatic biota includes loss of wetland habitat, alteration of stream flow and discharge, and increased turbidity. Mobile species would relocate, benthic macro-invertebrates would be lost during mining, but would re-establish in reclaimed aquatic habitats through natural dispersal.	Temporary adverse impact similar to proposed action, but on a smaller scale since only 1,122 acres would be affected.	Temporary adverse impact similar to the proposed action, but on a larger scale. Only habitats associated with Brushy and Horse Creeks would be preserved, therefore fewer opportunities for relocation of wildlife.	Temporary adverse impact similar to the proposed action, but on a smaller scale as 2,867 fewer acres would be affected.
Floodplains	Potential for impacts from urban and agricultural development with minimal regulatory oversight.	No long-term adverse impacts.	No adverse impact.	No long-term adverse impacts to Horse and Brushy Creeks, however other floodplains would be impacted.	No adverse impact.

Table 2.5-1 - Comparison of Potential Impacts by Alternative					
Environmental Considerations	**No Action Alternative**	**Compromise Area Alternative (IMC's Proposed Action)**	**No USACE Jurisdictional Wetlands Impacts Alternative**	**IMC'c Original Area to be Mined**	**Natural Systems Group Recommended Areas of Conservation Interest**
Threatened & Endangered (T&E) Species	Potential for impacts from urban and agricultural development with minimal regulatory oversight.	Temporary adverse impact. Mobile wildlife species, including T&E wildlife, would relocate to undisturbed areas of the property during land clearing, while less-mobile listed species such as gopher tortoises and their commensals would be captured and relocated. No federally-listed plant species would be affected. However, state-listed species of plants may be lost during land clearing. Efforts to avoid impacts to T&E plant and animal species include pre-clearing surveys, collection, and subsequent relocation to undisturbed or reclaimed habitats on or off-site.	Temporary adverse impact similar to proposed action, but on a smaller scale since only 1,122 acres would be affected.	Temporary adverse impact similar to proposed action, but on a larger scale since a total of 17,593 acres would be affected.	Temporary adverse impact similar to proposed action, but on a smaller scale since 2,867 fewer acres would be affected.

Table 2.5-1 - Comparison of Potential Impacts by Alternative					
Environmental Considerations	**No Action Alternative**	**Compromise Area Alternative (IMC's Proposed Action)**	**No USACE Jurisdictional Wetlands Impacts Alternative**	**IMC'c Original Area to be Mined**	**Natural Systems Group Recommended Areas of Conservation Interest**
Surface Water	Potential for impacts from urban and agricultural development with minimal regulatory oversight.	Temporary adverse impact. Slight reductions in runoff from mined areas being captured within the recirculation system. These reductions are partially offset by maintenance of base flow during mining and discharge of excess water to streams during periods of above-normal rainfall. Net effect to natural drainage systems would be minimal during low flows. Attenuation of peak flows would result in discharge over an extended period when mine storage capacity is exceeded. After mining is complete, discharges would likely be slightly reduced from pre-mining conditions.	Minor temporary adverse impact similar to proposed action, but on a smaller scale since only 1,122 acres would be affected.	Surface water quantity impacts would be similar to but greater than those described for the Proposed Action. The expected capture of rainfall in mined areas would be similar to the Proposed Action since areas would be reclaimed as mining progresses. Therefore, the resulting water quality in the recirculation system and discharged from NPDES outfall would also be similar. With regard to duration, water quality changes in receiving streams from NPDES discharges would be expected to occur for approximately three additional years since the life of the mine would be extended.	Surface water quantity impacts would be similar to those described for the Proposed Action Alternative. The expected quantity from captured rainfall and resulting onsite streamflows during mining would be similar to the Proposed Action Alternative. However, with regard to duration, the reduced streamflows would be expected to occur for approximately four less years.

Table 2.5-1 - Comparison of Potential Impacts by Alternative

Environmental Considerations	No Action Alternative	Compromise Area Alternative (IMC's Proposed Action)	No USACE Jurisdictional Wetlands Impacts Alternative	IMC'c Original Area to be Mined	Natural Systems Group Recommended Areas of Conservation Interest
Groundwater	Potential for impacts from urban and agricultural development with minimal regulatory oversight.	Localized adverse impact. Use of ground water would have localized effects on Floridan aquifer, but by the SWFWMD approving IMC's WUP they determined that the off-site impacts if any were justifiable. Withdrawals would be within the limits established by IMC's existing WUP.	Localized adverse impact similar to proposed action, but on a smaller scale since only 1,122 acres would be affected.	Impacts associated with this alternative would be similar to those described for the Proposed Action Alternative. However, since 1,757 more acres would be disturbed, the impacts would be somewhat greater.	Impacts associated with this alternative would be similar to those described for the Proposed Action Alternative. However, since 2,867 fewer acres would be disturbed, the impacts would be somewhat less.
Topography & Soils	Potential for impacts from urban and agricultural development with minimal regulatory oversight.	Minor adverse impacts. Onsite soils would have major changes from their existing conditions in that some areas would consist entirely of waste clay. Site topography in these areas would also vary, in that above ground settling areas would remain elevated after reclamation.	Minor adverse impact similar to proposed action, but on a smaller scale since only 1,122 acres would be affected.	Impacts associated with this alternative would be similar to those described for the Proposed Action Alternative. However, since 1,757 more acres would be disturbed, the impacts would be somewhat greater. No buffer around Oak or Hickory Creeks may result in greater impacts.	Impacts associated with this alternative would be similar to those described for the Proposed Action Alternative. However, since 2,867 fewer acres would be disturbed, the impacts would be somewhat greater.

Table 2.5-1 - Comparison of Potential Impacts by Alternative					
Environmental Considerations	**No Action Alternative**	**Compromise Area Alternative (IMC's Proposed Action)**	**No USACE Jurisdictional Wetlands Impacts Alternative**	**IMC'c Original Area to be Mined**	**Natural Systems Group Recommended Areas of Conservation Interest**
Hazardous, Toxic, and Radioactive Waste	No adverse impact.	No adverse impacts. Generation of hazardous waste would be limited to spent fluids used to maintain mobile equipment and the plant infrastructure, and managed in accordance with state and federal regulations.	No adverse impact.	Use of hazardous materials would be similar to the Proposed Action. Thus, impacts associated with this alternative would be similar to those described for the Proposed Action Alternative.	Use of hazardous materials would be similar to the Proposed Action. Thus, impacts associated with this alternative would be similar to those described for the Proposed Action Alternative.
Demographics	No adverse impact.	No adverse impact.	No adverse impact.	No adverse impact.	No adverse impact.
Community Services	No adverse impact.	No adverse impact.	No adverse impact.	No adverse impact.	No adverse impact.
Employment & Income	Adverse impact from lost jobs.	Beneficial impact from retained jobs.	Beneficial impact from retain-ed jobs, although the duration would be less because only 1,122 acres would be mined.	Beneficial impact from retained jobs.	Beneficial impact from retained jobs.
Local Economy	Adverse impact from lost jobs and wages, as well as lost tax revenue.	Socioeconomic impacts are generally positive with an increase in property tax revenue to Hardee and Polk Counties during the life of the mine.	Beneficial impacts similar to proposed action, but on a smaller scale.	Socioeconomic impacts are generally positive with an increase in property tax revenue to Hardee and Polk Counties during the life of the mine.	Socioeconomic impacts are generally positive with an increase in property tax revenue to Hardee and Polk Counties during the life of the mine.

Table 2.5-1 - Comparison of Potential Impacts by Alternative					
Environmental Considerations	**No Action Alternative**	**Compromise Area Alternative (IMC's Proposed Action)**	**No USACE Jurisdictional Wetlands Impacts Alternative**	**IMC'c Original Area to be Mined**	**Natural Systems Group Recommended Areas of Conservation Interest**
Environmental Justice	No adverse impact.	No adverse impact.	No adverse impact.	No adverse impact.	No adverse impact.
Land Use	Potential for impacts from urban and agricultural development with minimal regulatory oversight.	Significant temporary land use changes on the Ona site. No adverse indirect impacts are anticipated.	Adverse impact similar to proposed action, but on a smaller scale since only 1,122 acres would be affected. No indirect impacts.	Significant temporary land use changes on the Ona site. No adverse indirect impacts are anticipated.	Significant temporary land use changes on the Ona site. No adverse indirect impacts are anticipated.
Transportation	No adverse impact.	No adverse impacts. Existing trip generation levels would continue on SR 37, SR 62, and old SR 37 for the commensurate time period with traffic eventually increasing on SR 64 and CR 663 (the Fort Green-Ona Road) as employment shifts from Fort Green Mine to the Ona Mine.	No adverse impact.	No adverse impacts. Existing trip generation levels would continue on SR 37, SR 62, and old SR 37 for the commensurate time period with traffic eventually increasing on SR 64 and CR 663 (the Fort Green-Ona Road) as employment shifts from Fort Green Mine to the Ona Mine.	No adverse impacts. Existing trip generation levels would continue on SR 37, SR 62, and old SR 37 for the commensurate time period with traffic eventually increasing on SR 64 and CR 663 (the Fort Green-Ona Road) as employment shifts from Fort Green Mine to the Ona Mine.
Aesthetic Resources	No adverse impact.	Minor visual and lighting impacts.	Minor visual and lighting impacts.	Minor visual and lighting impacts.	Minor visual and lighting impacts.

Table 2.5-1 - Comparison of Potential Impacts by Alternative

Environmental Considerations	No Action Alternative	Compromise Area Alternative (IMC's Proposed Action)	No USACE Jurisdictional Wetlands Impacts Alternative	IMC'c Original Area to be Mined	Natural Systems Group Recommended Areas of Conservation Interest
Recreational Resources	No adverse or beneficial impact.	Beneficial impact from creation of re-creation opportunities during reclamation.	No adverse or beneficial impacts.	Beneficial impact from creation of re-creation opportunities during reclamation.	Beneficial impact from creation of re-creation opportunities during reclamation.
Air Quality	No adverse impact.	Temporary localized adverse impacts from fugitive dust and equipment emissions. No off-site impacts are anticipated.	Temporary localized adverse impact similar to proposed action, but on a smaller scale since only 1,122 acres would be mined.	Temporary localized adverse impacts from fugitive dust and equipment emissions. No off-site impacts are anticipated.	Temporary localized adverse impacts from fugitive dust and equipment emissions. No off-site impacts are anticipated.
Noise	No adverse impact.	Minor temporary adverse impact.	Minor temporary adverse impact.	Minor temporary adverse impact.	Minor temporary adverse impact.
Historic Properties	No adverse impact.	No adverse impact with mitigation.	No adverse impact with mitigation.	No adverse impact with mitigation.	No adverse impact with mitigation.

2.6 MITIGATION

An important part of a mining plan is the reclamation plan. IMC proposes to reclaim 15,836 acres of mined or disturbed lands to replace natural ecosystem functions on a portion of the Ona site, as well as to provide lands for agricultural and recreation/development uses. Twenty-eight Florida Land Use, Cover, and Forms Classification System (FLUCFCS) categories would be created, including both upland and wetland communities.

At a minimum, reclamation activities would fulfill the applicable obligations concerning post-reclamation vegetation conditions imposed by Chapter 62C-16, Florida Administrative Code (F.A.C.) and Section 2.06.06 of the Hardee County Unified Land Development Code (LDC), and the USACE mitigation requirements.

2.6.1 Vegetation

IMC's reclamation plans for the Ona site include 11,541.5 acres of upland communities, which would result in a total of 14,884.8 acres of uplands on the Ona site at the conclusion of reclamation. This corresponds to a ten percent loss in acreage of upland vegetative communities between the pre- and post-mining landscape. The reduction in acreage of upland communities arises from the reclamation of improved and unimproved pastures to other land uses, and does not reflect a loss of upland forest acreage.

Currently, open water areas at the Ona site are limited to cow ponds and ditches. IMC proposes to reclaim 1,034.5 acres of mined lands as open water, predominantly in the form of lakes. The total post-reclamation area of open water is projected to be 1,065.1 acres.

Based upon previous reclamation results, reclaimed and revegetated agricultural lands reach maximum productivity within one year, and herbaceous rangelands and wetlands reach maturity in approximately three years. Forested upland and wetland communities would require 40 years to reach maturity, although much of their ecological functional capacity is realized in about 15 years. The existing patchwork quilt of upland and wetland vegetation would be replaced with three large vegetative community types positioned and targeted towards three post-reclamation land uses: agricultural, recreation/development, and natural systems.

The natural systems would be reclaimed to form a contiguous mosaic of upland and wetland forests, rangeland, and herbaceous marshes that includes all of the north-south stream floodplain corridors as well as an east-west linkage to connect the stream corridors together. The repositioning of natural vegetative communities from the patchy distribution that currently exists to a connected belt of natural communities habitat corridor would result in the best long-term opportunity for significant habitat improvement.

2.6.2 Wetlands

Mitigation for wetland impacts would involve the creation of wetlands during the reclamation process. Wetlands created to fulfill proposed USACE mitigation are a subset of the wetlands that would be created as part of the reclamation plan. Due to discrepancies between the USACE and FDEP's jurisdictional wetland determinations, there are small differences in the acreage of wetlands being created as part of the state reclamation plan versus the mitigation plan for USACE jurisdictional wetlands. For example, USACE wetland mitigation would propose mitigation for 69.2 acres of disturbed bay swamp, whereas FDEP mitigation rules would propose replacement of 99.5 acres of disturbed wetlands during reclamation. However, most FLUCFCS show no difference between reclamation and mitigation, and the number of acres of proposed mitigation is always met, and often exceeded.

IMC's plans for the Ona site include mitigation of 1,252.7 acres of forested wetlands, 1,611.8 acres of herbaceous wetlands including 31.7 acres of offsite mitigation at the FG-3 reclamation program area, and 1,034.5 acres of open water including 1,019.3 acres of lakes. This would result in a post-mining total of 2,847.5 acres of USACE jurisdictional wetlands and 1,019.3 acres of lakes on the Ona site, as well as 31.7 acres of shrub swamps at the FG-3 reclamation program area.

The existing acreage of USACE jurisdictional areas by FLUCFCS code, acreage to be disturbed, and acreage to be mitigated is found in Chapter 4.0. The locations and identification numbers of wetlands to be created are also shown in Chapter 4.0.

2.6.3 Fish and Wildlife Resources

The wildlife and habitat management plan is considered the conceptual framework for the maintenance of habitat during mining and following reclamation. Based upon this framework, precise area-specific plans would be developed in advance of clearing particular portions of the site for mining. This approach is preferable due to the estimated 30-year mining and reclamation period and the 15,836 acres involved in the development of the Ona Mine, during which time the mining plans could change.

The goals and objectives of the plan are to minimize the loss of wildlife and wildlife habitat during the mining phase, and to create suitable wildlife habitat through the land reclamation process. Listed species present on areas to be cleared would be relocated to other suitable habitat in accordance with approvals granted by the USFWS and/or the

FFWCC. In this context, the success of the management plan would be the maintenance of viable populations of wildlife in the Hardee County region.

2.6.4 Threatened and Endangered Species

Reclamation activities relative to the protection of threatened and endangered species only involve the restocking portion of pre-clearing surveys and capture process prior to the commencement of land clearing. The actual reclamation activities (earth moving, planting, etc.) of the mined land would not normally impact federal- or state-listed species. The only exception is where listed species have occupied the active mine area (clay settling areas, etc.). In general, listed flora and fauna species would be protected by:

A. Relocation to reclaimed suitable habitat or other protected areas elsewhere on IMC property, but not necessarily on the Ona site;

B. Planned or natural reintroduction into reclamation areas, depending upon specific species requirements;

C. Allowing the species to migrate to adjacent habitat on their own, and/or;

D. Protecting the habitat that is proposed not to be disturbed.

Pre-clearing survey techniques, clearing or mining activity restrictions, and relocation details for selected species are listed in Section 4.4.

2.6.5 Surface Water

Prior to disturbing mining areas, IMC would design and construct a ditch and berm system capable of retaining all runoff from a 25-year, 24-hour storm event in accordance with FDEP and SWFWMD regulations. As new perimeter berms are constructed the following features are used for erosion control.

A. Silt screens are installed at the base of the berm. These screens are inspected and maintained as required.

B. Grass is planted on the exterior slope of the berm.

C. The berm is sufficiently flat in slope to control excessive erosion.

D. The roads on top of the berms are sloped toward the mine and away from the adjoining property or wetland.

Similar systems would be designed and installed sequentially across the Ona site in advance of clearing portions of these tracts for mining. The proposed system would prevent potential surface water quality impacts off-site.

The two stream segments directly impacted by mining, Oak Creek south of SR 64 and the headwater tributary to Hickory Creek, would be reclaimed to eliminate the channelization and ditching that has occurred historically. On directly impacted stream segments within the portions of the drainage conveyance where a sinuous channel is expected to develop, stacks of logs, snags, brush, and other energy absorption techniques would be used to reduce flow velocity to less than one foot per second. These techniques should retard natural erosional development and result in the desired sinuous stream channel geometry. Such methods would minimize impacts to water quality from erosion in streams. The final reclamation step would be the rerouting of flow into the reclaimed wetlands from a temporary alternate flow way and the subsequent regrading and revegetation of the then former temporary alternate flow way. The rerouting, in areas of previous ditching, is expected to result in a net water quality benefit when compared to the existing conditions. This benefit is increased water quality treatment capability because flow-through wetlands would replace ditched wetlands, thereby increasing retention time during low flow conditions.

IMC's existing operations have been issued National Pollution Discharge Elimination System (NPDES) permits for the discharge of excess water and storm water. All discharges must satisfy permit limits and not cause violation of water quality standards. The quality of IMC's mine process water is good, once suspended solids are allowed to settle.

All reclaimed land must meet water quality standards before it can be released from Florida Department of Environmental Protection (FDEP) mine reclamation requirements. The FIPR-funded research and other water quality analyses illustrate that reclaimed land does not cause violations of water quality standards (IMC, 2002).

2.6.6 Groundwater

There is a potential for water elevations in the mine cuts to remain below historical water table elevations through contouring of earth in reclamation. For this reason, IMC is proposing to continue to operate recharge ditches at least until contouring is completed in reclamation. The approximately 3,685 acres of the Ona site that are reclaimed from clay settling areas would have a surface soil with a reduced permeability compared to existing soils, whereas, the land reclaimed from overburden-capped sand tailings would have permeability similar to or higher than the pre-mine condition at the site. Almost immediately after mining, water elevations within the mine cut would begin to recover.

Prior to mining, IMC's policy is to sample and inventory neighboring wells located within 1,200 feet of a mining area. Water quality of the well would be characterized at that time. This effort is voluntary and is done at no cost to the neighbor. Results of the analyses are provided to the resident. This pre-mining water quality is used for reference should any concerns arise during mining and reclamation. Additionally, IMC would continue to monitor onsite water quality during the life of the mine. Should changes in water quality occur, they would first be noticed in these on-site wells.

2.6.7 Topography and Soils

All of the land proposed for mining would be backfilled with sand, clay or would be reclaimed by shaping the existing overburden spoils as part of the reclamation process. All of the sand and clay backfill would originate from Ona and nearby IMC mine property and the overburden spoil generated by mining the Ona site parcels would be beneficially used onsite as part of the reclamation process. The general topography and slopes that would be created would conform to the current FDEP and Hardee County standards that no slope be steeper than four feet horizontal (H) to one foot vertical (V). The only areas that would have slopes that approach this steepness are those around the reclaimed clay settling area dams. Generally, however, the site would be returned to the same relatively flat topography as currently exists.

Best management practices (BMPs) to control erosion and sedimentation would be utilized during the site preparation, construction, mining, and reclamation activities.

2.6.8 Hazardous, Toxic and Radioactive Waste

If hazardous materials were encountered within the project area during construction, they would be disposed of offsite, in accordance with appropriate federal and state regulations.

2.6.9 Socioeconomics

Visual impacts would be similar to those presently experienced along SR 62, which is parallel to and north of SR 64. Impacts would be mitigated by roadside ditch and berms systems, setbacks, and the duration of mining activity along highway frontage. Visibility from the roads could be mitigated somewhat by landscaped berms along the right-of-ways.

2.6.10 Air Quality

The operation of heavy equipment would have minor, temporary negative impacts on air quality during the construction and operation of the mine for either of the action alternatives. These impacts would be primarily in the form of increased exhaust emissions, which can be minimized by good vehicle maintenance. Windblown soil and dust may also occur during the construction phase as a result of equipment movement over exposed soil areas. Fugitive dust can be greatly minimized by appropriate dust control measures such as wetting the surfaces and by re-vegetating disturbed areas as soon as practicable.

2.6.11 Noise

The operation of heavy equipment would have minor, temporary negative impacts on noise during the construction and operation of the mine for either of the action alternatives. These impacts would be minimized by the use of mufflers on the equipment, and by restricting the times when equipment use would be allowed.

2.6.12 Historic Properties

Phase II testing must be conducted to determine the eligibility of site 8HR779. If the site was determined eligible, and the State Historic Preservation Officer (SHPO) concurs, data recovery from this site must be conducted to mitigate any impacts, to complete the Section 106 process and to obtain release from the SHPO.

If any archaeological resources are encountered during construction, work would immediately stop and the Army and the SHPO would be notified so that compliance with Section 106 of the National Historic Preservation Act would be accomplished.

If any archaeological resources are encountered during construction, work would immediately stop and the Army and the SHPO would be notified so that compliance with Section 106 of the National Historic Preservation Act can be accomplished.